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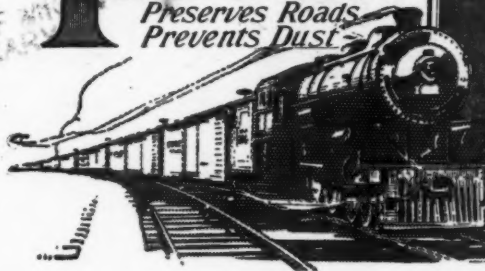
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## Tarvia

Preserves Roads  
Prevents Dust



## The Roads Must Help the Railroads—

**P**RECIOUS shipping is waiting in the harbor because cargoes are clogged on the railroads.

Factories are laying off their labor and closing because they cannot get raw materials through the railroad embargoes.

The whole internal commerce of the East is in a snarl, and it will be so intermittently till the end of the war and after.

Parallel with every railroad run the public highways. They are not clogged with traffic.

But they are clogged with mud or with neglect in various sections of the through-routes and the great swarm of motor-trucks traverse them slowly and with difficulty.

Clear those roads, the Nation needs them!

Don't let your locality be the weak link in the chain where an impassable mile put the whole interurban route out of commission.

Don't wait for the next county to act first; they may be waiting for you. It's no time to tolerate poor roads that might be easing the overload of the railways.

Build and treat your roads with Tarvia.

The Nation's plea to our local governments to refrain from public works that can wait till the end of the war does not apply to roads.

Roads were never so vital as right now. They will help us win the war.

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Gen. News



Top—Troop movement over Tarvia - treated Government Post-Road, leading from Fort Sam Houston, Texas.  
Middle—Military truck - trains need Tarvia roads for efficiency.  
Bottom—Tarvia-built road, N. Main St., Providence, R. I.



## A WONDERFUL INVENTION Self-Maintaining Day-and-Night Warning Signal

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Whether you pass to the left of the road, or to the right, at every point of the highway the peculiar bundle of red fire is ahead of you, changing its shape as you move on, but flashing its universally-understood danger message without interruption.

That's the new Automatic (self-maintaining) Road Signal.

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We invite correspondence with traffic authorities everywhere, with automobile clubs, state and county road authorities, railroads and others interested in accident prevention. We shall be glad to arrange for demonstrations of this wonderful signal.

**THE AUTOMATIC SIGNAL AND SIGN COMPANY**  
CANTON, OHIO



# Municipal Journal

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No. 14

## CORROSION OF SERVICE PIPES

**Investigation of Effect of Water Treated in Rapid Filtration Plants Upon Galvanized Iron and Lead Pipes—Low Alkalinity and Free Carbonic Acid Removes Galvanizing—Low Alkalinity Required by High Temperature.**

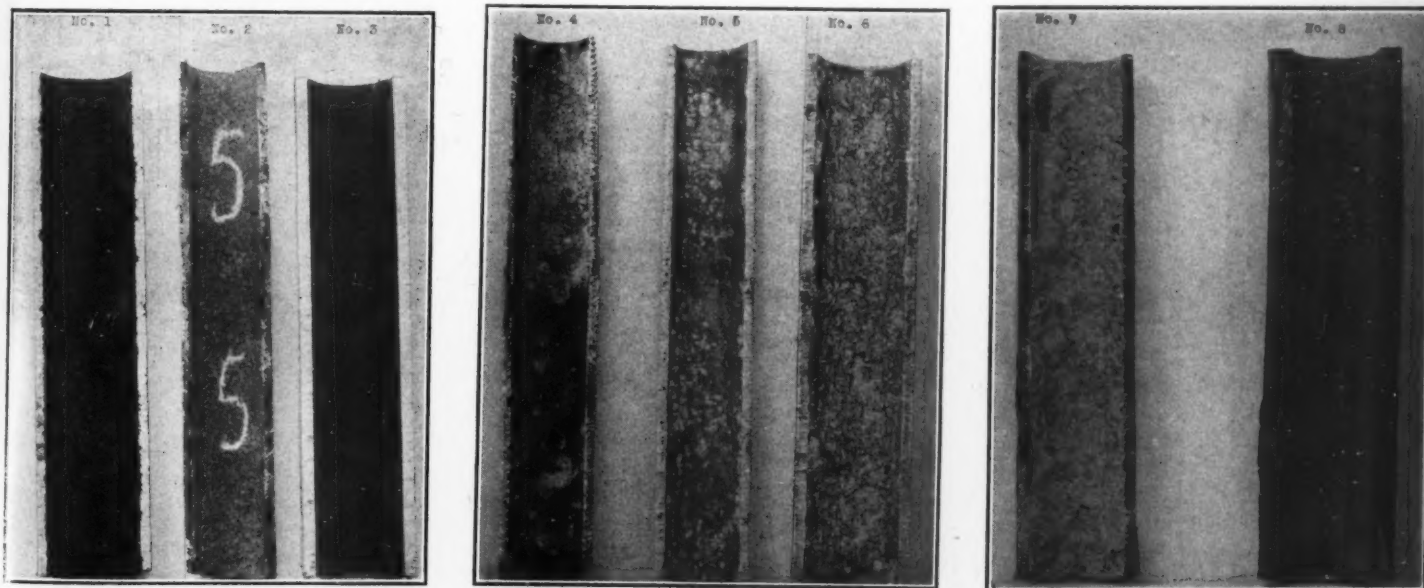
In his 1917 report on the water supply for municipal purposes in the Canal Zone, George C. Bunker, physiologist to the Panama Canal, describes some experiments made to determine the effect of the water supplied upon lead and galvanized iron service pipes. These and the conclusions therefrom are given in condensed form below.

Some trouble has been experienced with corrosion of service pipes, presumably due to the carbonic acid in the water, and a series of tests were made with the waters from the different purification plants. At Mt. Hope, 48 ft. of new  $\frac{3}{4}$ -inch galvanized wrought iron pipe was tapped into a 4-inch cast iron main running through the pipe gallery, which furnishes the supply of water for the ordinary daily use in the camp. An ordinary brass faucet was placed on the discharge end. Water was turned into this pipe on June 23 and run through it continuously, with two exceptions, at the rate of about 1 gallon per minute from 8 A. M. to 5 P. M. each day. From 5 P. M. to 8 A. M. the water stood in the pipe, the faucet being closed. Each morning daily determinations of alkalinity, free carbonic acid, color and iron were made of samples of the first water drawn off in the morning, designated as "over-night" samples; also

of running water collected about one hour later and designated as "running" samples. The pipe was under observation for 373 test days. Up to August the free carbonic acid in the "over-night" samples was much higher than in the "running" samples. The alkalinity was lower, and the color and iron were about equal. The free carbonic acid ordinarily ranged between 35 and 40 parts per million in the over-night samples and 3.5 to 5.0 in the running samples. After September 20 the free carbonic acid contained in the over-night samples was less than that in the running samples.

It was concluded from these tests that the effluent from this filter plant exerts only a slight corrosive action on pipe that has been properly galvanized, and will form only a thin coating on the interior. This conclusion has been corroborated by examination of the pipe used in this experiment and also of a service pipe from Cristobal.

Similar experiments were made on lead pipe with effluent at the Agua Clara purification plant, 25 ft. of new one-inch lead pipe being used. In the over-night samples the amount of lead increased to a minimum of 2.33 parts 21 days after the water was turned into the pipe, and from this time there was a decrease, and three months later



SPLIT SERVICE PIPES, SHOWING INTERIOR CONDITIONS.

No. 1.—Galvanized iron pipe removed after 5 years' service. Galvanizing removal and iron incrustation due to low residual alkalinity and free carbonic acid in filtered water.  
No. 2.—Experimental galvanized iron pipe at Mt. Hope purification plant. In service one year.  
No. 3.—Galvanized iron service pipe removed after 10 months' service, Ancon, C. Z. Water from Miraflores purification plant. Thin coating of iron oxide.

No. 4.—Experimental galvanized iron pipe at Agua Clara purification plant. In service one year.  
No. 5.—Experimental galvanized iron pipe at Agua Clara purification plant. In service one year.  
No. 6.—Galvanized iron pipe removed after 7 months' service from a house connection in Gatun, C. Z.  
No. 7.—Service line to Incinerator, Gatun, C. Z. Flow through pipe about 3,000 gallons per month.  
No. 8.—Experimental lead pipe at Agua Clara purification plant.

the lead contained in 19 out of the 21 samples was 0.3 parts or less. As would be expected, the amounts of lead dissolved by the water standing over night diminished as the free carbonic acid was replaced with carbonate alkalinity. Of the running samples only 3 contained as much as 0.1 part per million, and the majority less than 0.06 part. At the end of the test a section of the pipe was split, and the inside was found to be covered with a very thin coating of calcium carbonate. From these experiments the conclusion was drawn that the use of lead service pipes in the districts supplied by water from this plant is attended with no danger of lead poisoning so long as a carbonate alkalinity is maintained. It would be advisable, however, to allow the water which has been standing over night in a lead service pipe to run to waste during the first two months after its installation.

At this plant a test was made of the effect on galvanized iron pipe also. Throughout this experiment, lasting 380 test days, the alkalinities of the over-night samples were higher than those of the running samples, but the difference was always less than on the first two days, ranging from 1 to 11 parts. The colors of the over-night samples also were always higher than those of the running samples. They were also always higher in iron.

Gravimetric determinations of zinc were not made on the water from the galvanized iron pipe, but at the end of the run the residue from 100 c. c. of an over-night sample was tested micro-chemically and zinc crystals obtained; while a similar test of a sample of running water, collected on the same day, showed the absence of zinc. There was a cloudy appearance of the over-night samples that may be explained by the presence of iron and zinc in suspension.

While it was known that galvanized iron was not suitable for service pipes with a filtered water of low alkalinity and a free carbonic acid content of 5 parts or more, on account of the removal of the zinc and corrosion of the iron, it was thought that if a normal carbonate alkalinity were maintained the corrosive action would be slight and the physical appearance of the water standing one night would not materially differ from that running a few minutes. It was observed, however, that while the over-night water was not colored yellow to the extent that it was prior to the removal of the free carbonic acid, yet it presented a slight milky appearance and was not as clear as water drawn off a few minutes later. At the end of the test this pipe was split open for examination, and at the end bearing the brass faucet there was a uniform soft deposit of a brownish color that shaded off to a cream color about one inch back. This was undoubtedly the result of galvanic action. It is reasonable to assume that particles of this soft deposit might have been loosened when the faucet was opened in the morning, thereby accounting for some of the higher iron contents. The zinc coating on the interior of the pipe was in good condition with the exception of a few small pin-head deposits. There was a very thin slate-colored coating over it. A section cut from about mid-length of this pipe did not contain any rust, but was spotted with cream-colored tubercles ranging in size from a pin-head to irregular deposits  $\frac{3}{8}$ -inch long,  $\frac{1}{4}$ -inch wide and  $\frac{1}{16}$ -inch thick. Near the cast iron main the thin coating over the zinc was colored brown in spots and cream-colored tubercles also were present. The interior surface of this piece was much rougher than that from the mid-length of the pipe, and it was evident that dross from the spelter bath had adhered to the surface.

Examination was made of a one-inch galvanized iron pipe that had served as a service to a cottage for about six months. About 12,000 gallons of water per month

had passed through this pipe. A piece was also cut out of another service about 1,000 ft. long which had been in use about seven months. The condition of these two pipes was such that the continual use of galvanized iron pipe was considered inadvisable, not on account of the corrosion of the zinc coating, but because the soft deposit will reduce the capacity in a comparatively short period. The rate of accumulation of this deposit varies with the amount of water passing through the pipe, the smaller the flow and the greater the periods of time between discharges, the more quickly the incrustation forms.

It is evident that at the temperature of water prevailing in service pipes in the tropics (24 degrees to 30 degrees Centigrade), the normal carbonate alkalinity as  $\text{CaCO}_3$  must not exceed 8 parts per million as a provisional standard, with the possibility that this limit may be too high; instead of the 13 parts given by Whipple as a maximum beyond which precipitation will occur.

A piece of one-inch galvanized iron pipe which had been in service for five years was found to be covered on the interior with a rust-colored deposit from  $\frac{1}{16}$  to  $\frac{3}{16}$  of an inch thick. All of the zinc coating had disappeared. This furnished an excellent illustration of the action of a soft water that had been treated with alum with the resultant residual alkalinities varying from 2 to 10 parts per million and containing an average of 6 parts per million of free carbonic acid.

#### PUBLIC WORKS AND THE CITY ENGINEER.

All public works of Indianapolis, Ind., except those connected with sewage treatment and garbage disposal, are under the jurisdiction of a board of public works consisting of three members appointed by the mayor. The activities of the board are divided among six departments or subdivisions, these being the bureau of assessments, municipal garage, department of street cleaning, city engineer's department, street department, and public building operation. In a report made recently for the Indianapolis Chamber of Commerce by the New York Bureau of Municipal Research, the following comments were made upon the relation of the city engineer to the board, and especially the street department:

"The city engineer's department is responsible for highway design and construction, while the street commissioner's department is responsible for highway maintenance. Both of these departments are under the control of the board of public works. Similarly, the same situation exists in respect to the construction and maintenance of sewers.

"Considerable confusion in the procedure relating to permits and the inspection and replacement of permit openings results from this decentralized control.

"The functions exercised by the street commissioner's department, consisting briefly of highway maintenance, sewer maintenance, bridge maintenance, and the replacement of permit openings, are all engineering functions which should be supervised and controlled by an engineer and the methods to be employed should be recommended by engineers. In spite of this fact the street commissioner's department does not contain any engineering positions and the personnel is composed of other than technically trained men.

"The city engineer's department contains a force which is almost entirely composed of engineers of various degrees of training and experience. Despite this, the operations of the street commissioner's department are carried on without the aid of engineering service except through suggestions volunteered by the city engineer or advice requested by the street department. The ex-



tent to which the technical advice of the engineer's department is made available for use by the street department depends entirely upon the degree of co-operation existing between the two departments and their administrative officers.

"The fact that the heads of these two divisions or departments occupy co-ordinate positions might easily lead to interdepartmental jealousy and antagonism not at all conducive to the maintenance of a spirit of co-operation. Even though a high degree of co-operation may exist, it is unsound to divide the responsibility for construction from the responsibility for maintenance in connection with any public works undertaking.

"It is recommended that the street department or the street commissioner's department be abolished as such and that the functions performed by such department be absorbed into the city engineer's department.

"The abolishment of the street department should be accompanied by the abolishment of the title and position of street commissioner.

"A more appropriate title for the combined departments would be 'engineering department' rather than to retain the title of the city civil engineer with the name of the department, for the reason that the work is not entirely confined to civil engineering activities. This is recognized to be a point of little importance, however, and is not vital in connection with the reorganization."

At another point in the report it is stated: "The asphalt used in the maintenance of asphalt streets is manufactured in the city asphalt plant, which is controlled by the street commissioner's department. The city engineer's department includes in its organization an engineering chemist in charge of the testing laboratory. This engineering chemist acts as a staff-advisor in connection with asphalt specifications and the construction of asphalt streets. The advice of this office may or not be accepted by the street commissioner in connection with the operation of the city asphalt plant, depending upon the degree of co-operation existing between the two departments. This situation is a further proof of the illogical division of responsibility between the construction and maintenance of highways, especially of asphalt streets."

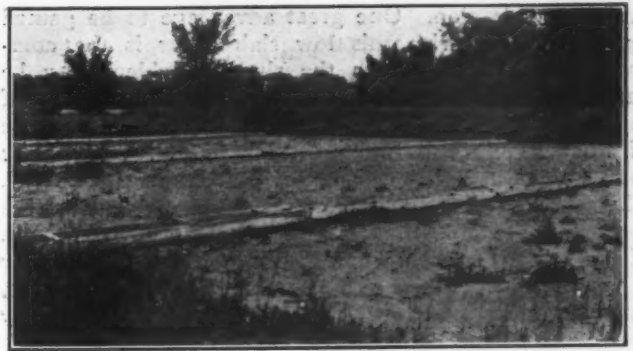
## OPERATION OF SEWAGE WORKS IN IOWA\*

### Recommendations Relative to Septic Tanks, Imhoff Tanks, Sludge Beds and Intermittent Sand Filters—General Suggestion for Operating Plants.

#### 2. SEPTIC TANKS.

The impression still remains in the minds of many city officials that septic tanks are cure-alls. One town council was found during the past summer with such confidence in septic tanks that just the possession of them was thought sufficient without actually running the sewage through the tanks. These tanks, built in 1913, had been by-passed ever since their construction.

It is of course well known now by all those at all acquainted with the subject that septic tanks are useful only in providing preliminary treatment for sewage. As with the grit chamber, the old-fashioned slab cover with a few manhole openings must be abandoned. No septic tank should be constructed which cannot be entered readily at all times. This requires a cover of such height above the sewage that the operator may walk erect upon the runways over the tank. The inlet channels to the septic tanks should be so designed that they are self-cleansing. Rectangular cross sections and slow velocities



FAIRFIELD. THREE SAND FILTERS WITH NO RIDGES SEPARATING THEM.

allowing deposits are to be avoided. Since most of our Iowa plants suffer from excessive infiltration of ground water during a long period in the spring, ample overflows must be provided, so that the septic tank may never work at a higher rate than it should. This subject of overflows has in the past received practically no attention in Iowa plants. Accordingly, during the spring, septic tanks either are by-passed, or their contents are so agitated by the flood of sewage and ground water entering them that the rest of the plant is permanently injured by the high amount of sludge carried out of the tanks through the siphons over onto the sand beds.

Ample provision should be made for the proper removal of sludge. This means, first of all, a sludge bed large enough for any use to which it may be put. With tanks designed with nearly level bottoms, as has been the custom in the past, it becomes necessary in sludging out the tanks to empty their contents upon the sludge bed. Of course one hears the wise advice that only small amounts of sludge should be removed from such tanks at a time. If any one has ever attempted to do this in Iowa tanks, where only a foot to two feet of clearance is available between the surface of the sewage and the cover, one knows how impracticable it is to



FAIRFIELD. PUMPING OUT TANK THAT WAS SLUDGED UP.

\*Continued from page 257.

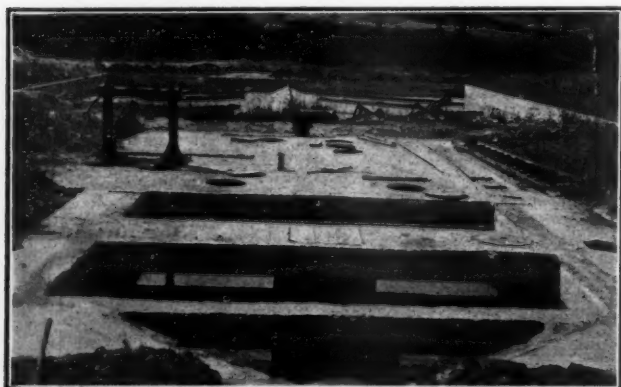
carry out this plan. One great advantage to be gained by doing away with this low slab cover is the comparative ease with which the sludge problem may be handled. The design of the slopes of the bottoms of septic tanks should be more carefully studied. The use of hopper-shaped bottoms should be more frequently found. The valves should be more conveniently located. The usual plan of having one valve at one end of the tank makes removal of the sludge unnecessarily difficult. If but one valve can be used, a much better position for it would be between the inlet and the center of the tank, but nearer the center, with the bottom sloping properly toward the valve.

All the valves used in septic tanks or in any other part of the disposal plant should be so made as to be operated easily. It has been the custom in the past to attempt to save money by using cheap sluice valves of poor design. It would be a good plan if the designing engineer were compelled, after two or three years, to return to the disposal plant which he has designed and, in case any valve is found which cannot be opened easily in two minutes, he should receive a jail sentence.

Frequently the designing engineer has apparently given little time to the study of the proper sizes of the two tanks which are usually found in Iowa plants. In most cases were such a study made it would be found advisable to construct one of the two tanks smaller than the other. To construct two tanks of the same size usually presupposes that the entire present population is to be connected at once to the sewers. The facts of the case are that after several years there may be only 50 to 75 per cent of the population connected. By properly proportioning the small tank, over-septicization of the sewage may be avoided. The old-fashioned flowing-through period of twenty-four hours injures the sewage for subsequent treatment upon filter beds. A period of flow of six to eight hours is an average requirement for Iowa conditions.

### 3. IMHOFF TANKS.

As with septic tanks and grit chambers, so with Imhoff tanks—the flat slab cover must be dispensed with. Every part of the Imhoff tank must be readily accessible. With some plants the side walls of the sedimentation basins must be cleaned and the slots opened once a day. With other plants once a month is sufficient. It is essential in constructing the sedimentation chamber that the surfaces upon which the solids settle should be finished smooth. The slopes of the bottoms of the sedimentation chambers should not be too flat. A wide enough slot at the bottom of the chamber should be planned so that the sludge may not readily clog it up. One large Imhoff tank plant visited during the past summer has been con-



NEWTON. IMHOFF TANK WITH OLD FLAT SLAB COVER CUT AWAY. TWO SAND FILTERS IN BACKGROUND.

structed without much attention to smooth surfaces in the sedimentation chambers. The ridges between the boards on the forms were nearly all in evidence. Two results are sure in such a case. First, the walls and aprons of the sedimentation chambers cannot be properly cleaned. Second, due to the fact that the sludge deposited is not all removed, some of it will become septic, and when gas-filled will rise to the surface, thus interfering with the proper efficiency of sedimentation.

The design must be so worked out that there are no sludge or gas pockets underneath the walls comprising the sedimentation chamber. Such sludge or gas pockets are frequently found in tanks provided with double sedimentation chambers with chimney gas vents between the chambers. The sludge and gas collecting in these pockets will eventually cause trouble by coming up through the slot in the bottom of the sedimentation chamber, thus interfering with the fundamental purpose for which Imhoff tanks are designed.

Wherever possible, there should be an emergency drain pipe so designed and constructed that the level of the sewage in the tanks may be lowered easily below the slots of the sedimentation chambers. In this way tedious and expensive pumping is avoided in case it becomes necessary to empty these sedimentation chambers in order to clean the slopes and open the slots, or to remove obstinate sludge from the digestion chambers.

Probably every Imhoff tank ought to be constructed with such connections to water under pressure that the sludge in the bottom of the tank, together with the sludge immediately underneath the bottom of the sludge pipe, may readily be broken up and agitated. Without such a connection to water under pressure, it has been found sometimes difficult to start the sludge out through the sludge pipe. Furthermore it has been found that as soon as the sludge came out, a cone of sludge was removed at the bottom of the tank, thus permitting raw sludge and even raw sewage to escape through the sludge pipe instead of the well-ripened sludge further out from the center of the tank. By loosening up the well-compacted sludge at the bottom of the tank by water forced under pressure through a grid, the formation of this cone may be controlled.

### 4. SLUDGE BEDS.

In connection with the discussion of septic tanks, it has been pointed out that sludge beds for septic sludge should have such areas that all of the requirements of operation may be satisfied. This statement also applies to sludge beds for Imhoff tanks. Before the sludge bed can be properly designed, the plan of operation for septic tanks or Imhoff tanks must be thoroughly worked out. All possibilities must be investigated.

The flow line of the inlet carrying the sludge upon the bed should be high enough above the surface so that the sludge will not back up in the sludge pipe, and thus with accumulated deposits ultimately stop it up. Distribution troughs are unnecessary for sludge from either septic tanks or Imhoff tanks.

The sludge beds should be as porous as possible. An inch or two of sand upon the top of about a foot of properly graded material is common practice in the large Imhoff plants in the east. Of course, immediately in front of the inlet must be placed a flat slab or baffling device to spread out the incoming flow of sludge, thus decreasing its velocity and preventing scour of the material composing the sludge bed.

The practice at many plants of sludging out tanks directly into drainage ditches or creeks should be discontinued. Sludge beds should be constructed and used, even if pumping is necessary. No direct by-pass of sludge to creeks should be included in the design of the plant.



## 5. SIPHON CHAMBERS.

A primary necessity for siphon chambers is that all parts of them be readily accessible. Accordingly the old-fashioned flat slab cover, close down to the surface of the sewage, must be abandoned. In case a flat slab cover is to be used, it should be at such a height that the operator may stand erect within the tank in carrying out the repairs frequently necessary upon the siphons and in flushing out the interior. Flushing connections are necessary, due to the accumulation of light, flakey sludge settling out of the effluent from sedimentation tanks upon the floors of the siphon chambers. The flushing valves should be so situated that the slope of the floor is toward the valve. In at least one plant in Iowa the sludge cannot be removed from the siphon chamber without considerable labor, since during construction the inspector did not insist upon the contractor constructing a smooth floor with the proper slope. Of course, a by-pass for the effluent from sedimentation tanks should be included in the design of the siphon chamber.

The word "automatic" siphon is a misnomer. While such siphons will operate automatically, occasionally for long periods of time, yet at any moment the proper alternation of the siphons may cease. Accordingly all piping, vents, blow off traps and starting wells should be so located as to be easily accessible. In many plants in Iowa it is so difficult to get at the siphons and their auxiliary connections that they are very naturally neglected. This means ultimately trouble and expense. For instance, unless it is easily possible to operate all of the valves upon the piping, they are likely never to be moved from one year's end to another. In this way they may become immovable.

## 6. INTERMITTENT SAND FILTER BEDS.

A great many filter beds in Iowa are overworked. Engineers differ concerning the area which should be provided. The state board of health has concluded from the information which has thus far come to its notice that under Iowa conditions with ordinary residential sewage from our small towns, intermittent sand filters may be operated at a rate of 200,000 gallons per acre per day. This assumes that one acre of sand filter will care for the sewage from 2,000 people. On the average 50 gallons per capita per day of domestic sewage is found. During wet weather this is increased for long periods of time by about 50 gallons per capita per day of ground water infiltration. Thus in the wet seasons of the year the amount per capita expected is about 100 gallons per capita per day. For short periods of time much higher rates are common.

Many filter beds have berms four to five feet wide at the top with slopes  $1\frac{1}{2}$  : 1 around each individual filter bed. When beds are symmetrically located side by side, much area may be saved if they are separated by sand ridges ten or twelve inches high. No inconvenience in operation has been found where this method has been consistently followed.

In selecting sand for sewage filters, the State Board of Health should be consulted. A study has been made of many of the sand deposits in Iowa and the requirements for filter sand have been adjusted to suit average Iowa conditions.

One common fault in the operation of filter beds in Iowa is the uneven distribution of the sewage over the surface of the bed. Two types of distributors are in common use, the plank trough distributor, and the sewer tile distributor. The plank trough distributor is commonly installed with branches leading out, ostensibly so as to cover well the surface of the bed with the incoming sewage. In actual operation these branches are some-

times removed and a single line of plank trough left down the center of the bed. In many cases these plank troughs are in a bad state of deterioration. In some instances they have been frequently floated out of place by the filters being flooded either from high water in the creeks or by infiltration of ground water into the sewers. In such cases the operator may not return them properly to place or properly to level. In general, the tile distributors, especially those consisting of a single line of tile down the center of the beds, were found to be giving better service than the plank distributors. The operators of the plants, however, need instruction as to how to alter the flow through both tile and plank distributors so that equal amounts of sewage may reach equal areas.

In some instances the banks around the filters were found to be washed down upon the surface of the sand with every rain. In such cases a trench should be made at the bottom of the slopes of the banks deep enough to intercept the wash from rainfall. After each storm this trench shall be cleaned out. In this way the sand surface itself will not become clogged. Of course the permanent remedy in such a case is to sod the banks.

In case the filter bed becomes flooded, under no circumstances should holes be made in the sand so that the sewage may find its way directly to the underdrains. This idea was tried out not long ago by the operator in charge of the plant at Grinnell. The result is easily imaginable. The underdrains were clogged and the filter beds put out of commission. Furthermore, spading of beds or plowing of beds should not be permitted. The surface should be stirred only to a depth of half an inch. This may be done, in case the surface mat becomes water tight, either with garden rakes or by a harrow and horse with the harrow specially constructed so that it would be impossible to work the sand deeper than half an inch. The driver must not be permitted to stand upon the harrow, since the sand would almost certainly be stirred too deeply. Of course, garden cultivators, stirring about three inches deep, should not be tolerated.

In the winter operation of beds in Iowa in the past, two methods have been followed. It is feared that the most common method has been to by-pass the beds directly into the creeks. This should be discontinued, since it defeats the purpose for which sewage treatment plants are designed. The second method used has been to ridge the beds so that the ridges might support the ice which forms during long continued cold weather. This year some of our plants are trying with success the pile method. This plan has been used for many years in large plants in the East. At the time of the last thorough fall cleaning before freezing weather sets in, the dirty sand and surface mat which is scraped up is left in piles, six to eight inches high, three to eight feet apart. It has been found that these piles support the ice and provide



IMPERFECT DISTRIBUTION ON FILTER. GRINELL.

small channels around their bases so that the sewage finds its way out beneath the ice cover over the surface of the sand.

#### GENERAL SUGGESTIONS.

In this discussion of some of the features of operation and design of this imaginary composite Iowa sewage treatment plant no attempt has been made to cover the field of operation and design completely. The books now available make any such attempt superfluous. Such scattering observations as have been made represent conclusions which any one might reach if he had the same opportunity of visiting so many plants within so short a time.

Viewing this composite sewage treatment plant as a whole, certain suggestions may be made. Every plant, no matter how small, should have included in its equipment a tool house. Of course, the superstructures of sedimentation tanks may be so designed as to serve this purpose, but usually no place is available to store the few implements which are required around the plant. Furthermore, the operator needs some protection from inclement weather. In this house the operator may make out the reports which ought to be required. Here he may carry out the simple tests which he ought to make. For instance, tests upon the efficiency of operations of the sedimentation tanks should be made. Probably the test which will in the long run prove most satisfactory (although it has certain drawbacks) is the use of the conical Imhoff glasses.

These glasses are about 4 in. in diameter at the top and 17 in. high, and have a capacity of one liter. By placing one liter of raw sewage in one glass and the same amount of tank effluent in the other, after two hours the cubic centimeters of settling solids are read. The removal of settleable solids ought to average 95 per cent.

Furthermore, the relative stability of the effluent, from the sand filters and perhaps of the water in the stream above and below the outlet ought to be determined. The methylene blue test for relative stability is so simple and yet so useful that it ought to be part of the weekly routine of the operation of all plants, no matter how small. A 0.05 per cent solution of methylene blue, preferably the commercial double zinc salt, is used. This is obtainable at any drug store. About 150 cc. of sewage is placed in a glass-stoppered bottle with all air excluded. After adding 0.4 cc. of the methylene blue solution, the mixture is kept at room temperature. It is observed regularly to determine how many days it will retain the

blue color. Ten days' retention of color is rated at 90 per cent relative stability. This means that the sample contains 90 per cent of the available oxygen required for perfect stability. The following table gives the relation between the time in days required to decolorize methylene blue at 68° F. and the relative stability number.

The sludge levels in the sedimentation tanks should be measured regularly. The engineer should leave with the operator devices for this purpose, such as a graduated cord or wire with a weighted board or iron plate attached in such a way as to remain horizontal. No plant visited possessed anything of this kind.

Certain industrial wastes must be guarded against. Grease from garages and waste from creameries and from gas plants must not find their way directly into the sewage treatment plant.

Some means must be provided for measuring the flow through the plant. In some cases an ordinary weir will enable this to be done. Another simple plan is to have some sort of float-operated recording device in the dosing chamber. Simple devices are upon the market for recording in this way the number of flushes which take place. By knowing the capacity of the siphon chamber, a fairly accurate knowledge of the rate of flow through the plant is obtained. It is strange in how few plants any idea exists as to the one fact which is most fundamental of all, namely, how much sewage is being handled. Of course the rate of flow through sedimentation tanks may be studied with the use of dye.

In many cases more attention ought to be paid to simple means of beautifying the grounds about our sewage treatment plants. The plant at Mount Vernon is an example of a successful attempt of this kind. Here a small amount of shrubbery has been obtained at little or no expense, and by its presence at the plant tones up the whole place.

Finally, this composite Iowa plant should have every by-pass sealed by the State Board of Health. Whenever such a seal must be broken, a written report, stating the cause, should be made to the Board within twenty-four hours. For violating this rule a severe fine or imprisonment, or both, should be fixed by law. The by-passing of sewage treatment plants has become a matter of course. The dictates both of law and of common sense are thereby transgressed with no compunctions of the community conscience whatsoever. The remedy recommended, though drastic, would correct much of the present carelessness and thoughtlessness.

(To be continued.)

#### \*Relative Stability Numbers.

Time required for decolorization at 68° F. Days	Relative Stability Percentage
0.5	11
1.0	21
1.5	30
2.0	37
2.5	44
3.0	50
4.0	60
5.0	68
6.0	75
7.0	80
8.0	84
9.0	87
10.0	90
11.0	92
12.0	94
13.0	95
14.0	96
16.0	97
18.0	98
20.0	99

\* Standard Methods of Water Analysis: Amer. Pub. Health Assoc. 1917, p. 70.

#### NAMING COUNTRY HIGHWAYS.

A generation ago, before the development of the automobile, comparatively few city dwellers visited the country highways and few country dwellers traveled with any frequency beyond the immediate vicinity of their homes. Under these conditions, the necessity of signboards and other means of identifying country roads was not nearly as great as at present. Nowadays, however, the owner of the automobile travels over and passes the intersections of as many country highways in an afternoon as his father did when travelling on foot within city limits.

This suggests that, just as it is desirable to introduce some method in the naming of city streets and the numbering of properties thereon, so a similar method should be employed for naming country highways and locating the farmers' private holdings past which they run. Probably reasoning along these lines, a committee in St. Joseph County, Indiana, has recommended to the county commissioners that all the rural highways in that county be named after a regular system as follows: Roads running east and west and north and south will be desig-



nated as roads, while those which run diagonally will be called highways. The naming of north and south roads will begin at the east line of the county and that of the east and west roads at the north line; and the numbering of farm houses will begin at the same points. North and south roads will be named after trees, shrubs and flowers, the names being arranged in order alphabetically; for example—Ash, Birch, Cypress, etc. In that state most of the roads follow section lines, and these will be named after trees. Where there are roads intermediate beyond these mile-apart roads, such intermediate roads will be named after shrubs and flowers. As each letter indicates one mile, the initial letter of the name of any road will tell how many miles it is from the east or north line of the county. The east and west roads will be named for United States presidents, governors of Indiana, Indiana statesmen and Indiana authors, and will follow the same alphabetical plan.

## CENTRIFUGAL PUMPS OF ST. PAUL WATER DEPARTMENT

### Test of Electrically Operated Plant with Capacity of Fifteen Million Gallons a Day—Single-Stage Centrifugal Pumps Used.

The Water Department of St. Paul has recently installed an electrically operated pumping plant that has a capacity of over 10,000 gallons per minute against a total head of 171 feet, or about 15,000,000 gallons per day. The plant is located at the McCarren Pumping Station. The following figures showing efficiency and other characteristics are from a report by J. W. Kelsey, principal assistant engineer, to G. O. House, general superintendent of the water department.

There are two 12-in. centrifugal pumps, the specifications for which required that each deliver not less than 5,000 gallons per minute against a total static and friction head of 171 feet, and not more than 5,500 gallons against a head of 158 feet, with an overall efficiency from "wire to water" of not less than 72 per cent when pumping continuously under either of the conditions named. It was further required that if the head fell to 140 feet the motor should not be overloaded.

The successful bidder, the Northwestern Electric Equipment Co., guaranteed an efficiency of 74.3 per cent at either 158 or 171 feet head, and an overall efficiency of 73.7 per cent at 140 feet. The company furnished pumps manufactured by the De Laval Steam Turbine Co., of the single-stage double-suction volute type, having 12-inch suction and discharge nozzles. No diffusing vanes are used. These are operated by synchronous motors of the rotating field type manufactured by the Electric Machinery Co. of Minneapolis. The motors receive three-

phase, 60-cycle current at approximately 2,200 volts and drive the pumps at 1,200 r.p.m. They are so designed that they can be started by the application of alternating current to the armature windings. In normal operation they are supplied with exciting current by directly connected exciters of 1¼-kilowatt capacity.

After installation, both units were subjected to very complete tests to determine both efficiency and head-capacity characteristics. Before the official tests were run the impellers had been turned down slightly in diameter, due to the fact that the motors were operating at 20 r.p.m. above rated speed.

Before beginning the test, the pressure gage of each pump was taken off and calibrated on a dead weight testing instrument, and then replaced. The static head of water was determined by finding the elevation of the center of the gages and the elevation of the water in the high service reservoir. The head determined from the elevations was found to agree with the calibration obtained with the dead-weight testing instrument. The readings of the suction gages also were checked against elevations in a similar manner, and found to be correct. As they registered zero with no pressure, and as the variation in head was never more than 10 ft., it was assumed that readings of the gages between zero and 10 ft. would be proportional.

The quantity of water delivered was measured by a 30-in. by 13-in. Venturi meter, supplied by the Builders Iron Foundry Co., of Providence, R. I. The recording instrument supplied with this meter includes an indicating dial, a recording card and an integrating counter, but in order to verify the accuracy of its readings, an indicating mercury manometer was also connected to the pressure pipes of the Venturi tube.

The electrical measuring instruments were checked and calibrated subsequently by comparison with standard instruments by representatives of the Northern States Power Co.

In running the test, the head against which the pumps worked was controlled by means of a hydraulic gate valve on the discharge side of the pumps. After throttling the gate valve no readings were taken until all instruments had ceased fluctuating, after which two or three readings were made and averaged, if any variations were found. Observations were made with the pumps operating under four different heads, covering a wide range of delivery.

The results obtained on the official test are shown in the tabulation given below. In computing the efficiencies of the pumps alone, motor efficiencies, as obtained on tests of the motors by the University of Minnesota, were used. On motor No. 403,115, the following efficiencies were obtained:

Full load, 95.5 per cent, three-quarter load, 94.9 per cent, one-half load, 93 per cent.

Motor No. 403,129 gave the following results:

#### RESULT OF OFFICIAL TEST OF PLANT.

	Motor No. 403,129—Pump 25,651				Motor No. 403,115—Pump No. 25,650			
	2230	2240	2240	2250	2260	2270	2295	
Volt Meter .....	2230	2230	2240	2250	2260	2270	2295	
Rec. Watt hr. meter.....	234.0	225.0	210.0	165.0	224	217.4	204.8	
A. A. Ammeter.....	62	59.5	55.5	44.5	57.6	56	52.4	
P. F. Indicator per cent.....	100	100	100	100	100	100	100	
Ind. Wattmeter .....	233.3	226.2	210.1	165.3	226.3	220.2	206.0	
Vent. Manometer .....	9.75	8.50	7.25	4.60	9.4	8.24	7.1	
Press. gage ft.....	147.25	165.25	179.25	195.75	146.5	163.0	176.5	
Suc. gage ft. press.....	4.0	6.0	7.5	10.0	3.2	5.0	6.5	
Total head feet.....	143.25	159.25	171.75	185.75	143.3	158.0	170.0	
R.P.M. ....	1220	1220	1220	1220	1220	1220	1220	
G.P.M. ....	6771	5900	5035	3194	6527	5722	4930	
Water H. P. ....	245.1	237.5	218.4	150.0	236.4	228.7	211.9	
Electrical H. P.....	312.9	303.3	282	221.7	303.4	295.2	276.1	
Overall Efficiency .....	78.4	78.3	77.7	67.7	78.0	77.5	76.4	
B.H.P. ....	298.5	289.6	269	209.9	289.0	280.8	262.2	
Pump Efficiency .....	82.2	82.1	81.2	71.5	81.8	81.5	80.7	

Full load 95.3 per cent., three-quarter load, 94.6 per cent, one-half load, 92.5 per cent.

The test results of the units show the variations in head and capacity at constant speed together with electrical horsepower input and overall efficiencies.

The efficiencies obtained on these pumps are quite high, considering the comparatively small capacity and the high head. Many builders would advocate the use of diffusing vanes for such conditions; but these would make the pump more expensive and complicated without, it was believed, any gain in efficiency. The efficiencies are further very high over a considerable range in rate. Take for instance, pump No. 25,651, which, at a rate of 6,527 g.p.m., shows an efficiency of 81.8 per cent, and, at 4,097 g.p.m., an efficiency of 77.0 per cent; or, for a reduction in rate of about 37 per cent, there is a reduction in efficiency of only 5.9 per cent, which must be considered very good for a centrifugal pump.

The pumps deliver slightly more than 5,500 g.p.m. at 158 feet total head, but this was not objectionable in view of the fact that the efficiency was very high also at low heads, which in this particular case was of great advantage, as can be seen from following quotation from the official report:

"As to the quantity of water pumped, it will be observed that it more than meets the requirements of our specifications. The clause in our specifications limiting the quantity of water to 5,500 gallons per minute when working against a head of 158 feet was inserted to insure a high efficiency at this pressure. It was our belief that the maximum efficiency would be obtained when pumps were working against a much higher head. Fortunately, however, the reverse is true, and our pumps are delivering a greater quantity of water, with a higher efficiency than was anticipated at the lower heads.

"As stated before, the friction loss in our force mains is less than computed, with the result that our operating head is somewhat lower than provided in our plans, which explains one of the main reasons for reducing the effective diameter of the impellers. The consequence is a greater quantity of water, at a higher efficiency against our prevailing dynamic heads."

## WATERLOO'S SEWAGE PUMPING STATIONS

### Description of Three Small Plants, Cost of Same, and Experiences in Operation—Motor Driven, Automatically Stopped and Started.

Waterloo, Ia., pumps in small amounts at three different stations, such pumping being rendered necessary by the same conditions as require it in other cities—the existence of small areas of land too low to drain into the system by gravity. In a paper before the Iowa Engineering Society, assistant city engineer G. H. Kilpatrick described these stations and their operation, from which paper the following is abstracted:

A section known as Cedar River Park, containing approximately 30 acres, was annexed to the city in the year 1913. When an attempt was made to sewer it, it was found that a small part, which it is estimated will contain 102 dwellings ultimately, was too low to reach this system by gravity and a pumping plant was installed, it being estimated that it would serve 510 persons contributing 80 gallons of sewage per capita per day. A submerged centrifugal pump, motor driven, vertical shaft type, with a 6-inch suction and a 4-inch discharge, manu-

factured by the American Well Works, was installed, driven by a 7½ h.p., 60 cycle, single-phase, 220 V., A.C., Wagner motor, equipped with an automatic controlling device. The sewage is received in a well with a storage capacity of 2,160 gallons. Two vertical screens, made of No. 4 galvanized wire on substantial iron frames held in place by grooves in concrete pilasters extending 4 ft. above the floor of the reservoir, divide the pump from the main part of the storage well. The concrete reservoir cost \$700, the pumping outfit complete cost \$505, and the brick house enclosing them cost \$265.

In the early winter of 1917, 86 persons were occupying this area. Between January 20th and February 20th of 1918 the average daily amount of sewage pumped was 2,004 gallons, and the pump operated 57 times, or less than twice a day. The first winter after the station was put into operation the amount of sewage was much less than this and considerable trouble was experienced from freezing because of the long time that the sewage lay in the reservoir before being pumped. To overcome this difficulty, a hot water radiator was placed in the reservoir, heat being supplied by a gas heater. With an increased quantity of sewage entering the reservoir, this trouble has disappeared. Another objectionable feature due to the infrequent pumping was caused by the putrefying of the sewage in the reservoir, the odors therefrom escaping through the ventilator of the building and causing some discomfort to those residing near the station, especially in warm weather. Mr. Kilpatrick suggests that it would be advisable to provide a water connection into a station of this kind, which would permit the use through a hose of water under pressure by which, aided by a brush, the side walls of the reservoir and the pump could be cleaned of any deposits.

Another pumping station serves only 31 residential lots and is enclosed on three sides by public park property. When the building was planned, however, a part of the land was still owned privately and it was estimated that it would be laid out into about 110 additional lots, and provision was made for pumping 27,125 gallons a day.

In this plant the roof of the reservoir is 4 ft. beneath the natural ground level. The reservoir is circular, 7 ft. in diameter, and has a storage capacity of 1,010 gallons. It is surmounted by a circular pump house 6 ft. in diameter, built of hard red brick and having a galvanized roof. The equipment consists of a 3½ h.p., 60 cycle, 104 V., A.C., Century motor, with an automatic controlling device, operating an American Well Works submerged centrifugal pump with 3-inch suction and 3-inch discharge. The lift is 11.62 ft. The cost of the station complete was \$922. This plant between January 20th and February 20th pumped a daily average of 510 gallons, only 20 people at present contributing sewage.

The third station was planned to take care of a large tract of land which is separated from the city by a creek and lies so low that an 18-ft. lift is necessary. Plans were made for a future population of 10,520 people on this tract. The reservoir is rectangular, 8 by 12 by 20 ft. The walls are of the steel reinforced type. The roof is a concrete slab 8 inches thick and reinforced with half-inch square bars placed 1½ inches above the bottom of the slab. The pumping plant consists of a 5 h.p., 60 cycle, 3-phase, 900 r.p.m. Lincoln motor, operating a 400 g.p.m. American Well Works submerged centrifugal pump, vertical shaft type, having a 4-inch suction and a 4-inch discharge. A vertical screen with two-inch mesh made of No. 6 galvanized iron wire on a substantial iron frame is set in a 6-inch partition wall that separates the pump wells from the main part of the reservoir. The pump wells are 3.66 by 4 by 6 ft. Connection is made



with the creek so that it will be possible at any time to thoroughly flush the reservoir with creek water. The total cost of this station was \$2,775.

At the present time this station receives the sewage from one residence and all of the factory waste and sewage of several factories and offices. The total amount averages 42,000 gallons a day, requiring the pump to operate less than two hours a day.

## LINCOLN'S LIGHTING DEPARTMENT

### Current Furnished for Street and Domestic Lighting —Incandescent Lamps Replace Carbon Arcs— Cost of Street Lighting Reduced.

Current for street lighting and for a certain amount of commercial use is furnished by the municipal lighting department in Lincoln, Nebr. For six or seven years, current was furnished for street lighting only, but beginning with October 15, 1913, the department was authorized to sell current and by the end of last year had 1,650 consumers. Current is generated at a central station at which there are four generating units, 250 k.v.a., 500 k.v.a., 750 k.v.a., and 350 k.v.a., respectively, each 4,400-volt, 3-phase. Nine 7.5 ampere series arc circuits serve 541 street lamps, one 3-phase circuit serves 302 cluster poles, and three primary circuits, 3-phase, are used for incandescent lights.

The department makes a most commendable effort to keep its equipment up-to-date in order to maintain high efficiency. In the report for 1917, the superintendent says: "Some very rapid improvements have been made in the electrical industry, so that one must keep pace with the new appliances used in order to reduce the cost of production. In the past year the lighting department has abandoned practically all of the old light arc lamps, which burned carbons and had continually to be replaced. The new type incandescent lamp which we now use has proved very satisfactory. They not only give a more steady and stronger light, but where we formerly had 50 lights on a circuit we now have 100 lights, with no greater consumption of current. Before we installed the new incandescent lamps, all our circuits had been over-loaded, and the only way to increase the number of lamps would have been to build new circuits direct from the station at a large expense. This installation not only enabled us to put out more street lights, but has reduced the k.w. consumption on the street circuits."

The new lights installed are type C-600 c.p. street series lights.

"Notwithstanding the unusual conditions existing at the present time on account of the war, prices of coal and material all having increased considerably, the operating costs are very favorable. The average cost for each street light has been reduced from \$28.16 to \$23.90 per year. The increased cost per pole on the down-town ornamental lighting system from \$17.80 to \$27.80 per pole per year is due to the great amount of repairs required on this system. This system was originally installed using only rubber-covered wire in the conduits, which should have been lead-incased. This was at that time brought to the attention of the council, but the contention then made was that the cost was prohibitive and, should the rubber-covered wire wear out, it could be replaced with the lead-incased cable when such parts became defective. In the past year we have had very much trouble with various sections at some places, showing the rubber worn and grounding on the conduit; at other places water got into the conduit and short-circuited the line."

More than one-half of the current generated is used for operating the water works pumping plants. The water and light services are both operated by the same department and under one head. During the year 1,960,348 k.w. were used for pumping and 1,549,532 for lighting. The net cost at the switch-board was \$24,901.27, of which the largest items were coal (including cost of unloading), \$16,068.19, and \$8,947.78 for station salaries; the other items including oil, waste, repairs, insurance, and station expenses. The net cost per k.w. on the switch-board was 1.641c. The report also gives a statement by which to calculate the cost for comparison with the cost to private corporations, this including  $4\frac{1}{2}$  per cent interest on the bonded debt,  $4\frac{1}{2}$  per cent interest on the balance of the investment, 5 per cent depreciation, 5 per cent sinking fund to retire the bonds, and city and county taxes. These add to the net cost 0.57c per k.w. Including also the other costs beyond the switch-board, the cost per k.w. for the arc system was 2.65c, for the cluster system, 2.62c, and for the incandescent system, 2.35c.

## LAYING CONCRETE PAVEMENT IN FREEZING WEATHER

### Method Employed Successfully Last Winter at Fort Oglethorpe—Thawing Sub-grade—Warming at Night with Lanterns under Canvas.

In discussing the subject of concrete pavements at the convention of the American Road Builders Association, A. B. Dunning, chief engineer of construction, Quartermaster's Department, U. S. Army, described a method employed by him in laying a concrete pavement when the temperature fell below freezing at night. His description was as follows:

I desire to relate my experience on a concrete road which is now in process of construction for the War Department, at Fort Oglethorpe, Georgia. The grading of the road and the placing of concrete started about the first of last November, the sub-grade being the bed of an old chert road, very firm and hard. During the month of November the thermometer ranged from 50 to 87 degrees. In December it dropped to as low as 9 degrees above zero, consequently the finished work had to be protected from the various changes of temperature. This was done by placing "horses" across the pavement, upon which canvas was spread, and kept thus covered until the concrete had set sufficiently to allow the spreading of manure or straw over it, thus protecting the same from the extreme high temperatures. This worked all right until about the 7th of December, when a cold wave came, and the temperature became so low during the day time that it was impossible to do any work.

I never was in favor of laying concrete in freezing weather, especially upon concrete roads.

I want to make a distinction between laying mass concrete and laying concrete for pavements. When the work is so concentrated one might be able to handle the materials in such a way as to lay concrete in freezing weather, but so far as a concrete pavement is concerned, where the work is distributed over an extended area, for my part I am going to keep just as far away from freezing weather as possible.

On the 20th of December we resumed work with the thermometer ranging from 20 to 64 degrees during the day time, but during the night it dropped to freezing and lower.

The temperatures mentioned above are from the beginning of the work each day until the close. The tem-

perature fell far below this during the night, causing freezing weather, but at no time was the work allowed to proceed until the temperature was above freezing, and it was suspended before reaching the freezing point each day.

But how to protect the work which had been laid, and what to do with the frozen material and sub-grade next morning?

A new feature to us was adopted in thawing out the sub-grade and material. This was done by covering the space with canvas, and connecting a pipe with the boiler of the mixer, and forcing steam under the canvas. This worked all right.

But protecting the newly laid concrete from the low temperature during the night was another question. We finally succeeded in the following manner: At the suspension of work for the day, or rather up to the time that the temperature had reached about the freezing point, "horses" were placed across the newly-laid concrete about 8 feet apart, said "horses" being about one and one half feet above the concrete. Upon the horses was spread canvas, thoroughly anchored on both sides and ends, and lighted lanterns were placed underneath this canvas at a distance of about eight or ten feet apart. This was done by locating them on the forms protecting the side of the concrete, or hanging them to the "horses." This brought the temperature up to 50, under the canvas while on the outside it ranged from freezing to as low as 9 degrees.

This proved a complete success, so that during all the cold weather we had in the month of December, when we laid the concrete in the day time when it was above freezing, we did not lose one cubic foot of concrete on account of the freezing temperature at night, the temperature having dropped as low as nine degrees above zero.

We thus continued until the 28th of December, when snow and colder weather caused us to suspend the work, and it has been practically suspended until the present time.

The lantern feature was suggested by one who, when living in a northern climate, had placed a lighted lantern under the Buffalo robe when sleigh riding.

## DULUTH WATER AND LIGHT DEPARTMENT

### Freezing of Water and Gas Mains—High Prices Increase Cost—No Extensions on Ungraded Streets—Assessing Extension Costs.

The water and lighting services of Duluth, Minn., are operated by one department, under the charge of the commissioner of public utilities, P. G. Phillips, the same officers having charge of all departments of both services except the engineer in charge of the pumping works and the engineer in charge of the gas works.

The report for the year 1917 shows a considerable increase in expenses of the department over previous years. The operating expenses of the water service, for instance, were increased more than \$17,000, but a considerable part of this was due to the large number of frozen services. During January, February, March and April of last year, over 1,200 services and 25 or 35 water mains were frozen, necessitating the use at one time of three electric thawing machines and two steam boilers. The same unusual difficulty was found with the gas mains also, which were obstructed by water getting into them and freezing. The latter trouble apparently was due not to moisture carried over with the gas but to outside

water getting into gas pipes and freezing the pipes solid where they were surrounded by frost. For this reason the curious condition existed that, whereas the water mains froze most generally where they were too near the surface, the gas mains gave most trouble where they were deep, being as low as and sometimes lower than the water pipes, the leakage from the water mains apparently entering leaky joints in the gas mains. Gas pipes that were shallow or were laid on the surface of the ground gave no trouble. An over-land high-pressure gas pipe, which for over one-third of a mile is laid on the surface without any covering whatever, gave no trouble from freezing.

In addition to these unusual troubles, however, there was considerable increase in cost due to the general advance in prices. The increases in wages during the year amounted to nearly 20 per cent. Cast iron pipe cost nearly 70 per cent more than in the previous year, brass goods about 10 per cent, and coal, 133 per cent. While the gross revenues from water showed a total increase of \$11,000, the net revenues showed a decrease of \$16,000 from the previous year; while the gross increase in gas revenue of nearly \$30,000 was reduced to \$2,700 by the increased costs. It would seem probable that the gas business will show an improvement this year. The city does not manufacture its own gas, but purchases it from the Zenith Furnace Co., and last year made a new contract with the company by which the cost to the department of gas for general purposes was reduced from 40c to 37½c, and that of gas for house heating purposes from 37½c to 32½c per thousand cubic feet.

At the end of 1916, 90.2 per cent of the consumers were on meters, the balance being flat rate customers; while last year, the percentage of metered services had increased to 93.2 per cent, and the total number of flat rate consumers was 847 as compared with 1,117 the previous year. All new customers are being served with meters and the old ones on the flat rate are permitted to exist only where there is difficulty in installing meters that will be safe from freezing and where no connection has been made to the sewer and there is no private drain that would permit water to waste in order to prevent freezing or for the purpose of cooling or refrigerating.

Owing to the increased cost of making extensions of mains, and especially to future trouble stored up by laying mains in streets where grades have not been established, it was decided that no extensions would be made on ungraded streets or where there were less than six houses to the block. "It does not seem practicable to make these extensions in all cases where requested unless there is a real existing demand for the service, and unless it can be made at a reasonable cost and without too much of a burden upon the department. It must be borne in mind that the present assessment of 8 per cent of the cost of each extension against the abutting property does not make the extension self-sustaining to the department in its fullest sense. In addition to the interest upon the investment, the depreciation and sinking funds necessarily must be provided for as well as the maintenance of the mains and repairs on account of leakages and breaks. There is also the additional operating cost where extensions are made on the outskirts of the system, on account of the increased distance which it is necessary to convey the water, which in some portions of the city requires the water to be pumped three times in order to reach the consumer, who is charged one price identical with charges to all other consumers regardless of their location. Neither does this charge cover additional expense necessary to increase the main plant, pipes, reservoirs and pumps, to convey both water and gas from their source of supply through the main plant to the distant consumer."



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## THE FUNCTIONS OF A CITY ENGINEER.

Our attention has been called to a proposed change in the organization of those departments and officials of a certain New England city that are concerned in the engineering work of the city, and especially that important branch of it that has to do with the city streets and paving. There appear to be two departments in the city known as the engineering department and the highway department, and it is proposed to abolish the former and place all engineering work of the town under the charge of a superintendent of streets.

On another page a quotation is given from a report upon a plan for the reorganization of the Public Works Department of Indianapolis, in which the Bureau of Municipal Research recommends that the street commissioner's department be abolished and its functions be absorbed in the city engineer's department. Here we have the exact reverse of the change proposed in the Massachusetts town, and the question naturally arises as to which is preferable. The report just referred to gives excellent reasons for a combination of the two classes of functions under one head, and we may assume that such combination is desirable. But the idea of making the city engineer a subordinate of the superintendent of streets can only, it would seem to us, result from the opinion (that is even yet too commonly entertained) that engineering is merely a matter of giving line and grade and measuring work. It is unfortunate that there is not a more general realization of the importance of the designing and planning of work by engineers—that this is by far the most important work performed by engineers and that requiring the most skill, that it can effect great saving in cost and great increase in effectiveness of the

work done, and that the non-technical man is even less capable of performing such work than of using surveying instruments.

In the case referred to, the committee recommending the change apparently had a very indefinite idea as to what the duties of even a superintendent of streets are, since, in giving an extensive list of such duties, they included only the keeping of records of money expended and work done, of teams and men employed and materials used, and the preserving and indexing of plans and documents connected with the engineering work. Not a word about planning work, or even of supervising construction. To carry out the ideas which they apparently had in mind, the duties of superintendent of streets could be performed by one who had had a little experience as time-keeper for a contractor, while the "engineering" could be performed by a young man who had had a few months' experience in the use of transit, level and steel tape. The real engineering will probably be confined to decisions made by the selectmen and the tax-payers along the streets. If this scheme goes through, it will be interesting a few years from now to visit this town and learn to what degree of dilapidation and disrepair the several streets, sewers and other public works have degenerated under this amateur supervision.

## OIL EMBARGO THREATENS DESTRUCTION OF ROADS WORTH TENS OF MILLIONS.

A few days ago we received from Wm. D. Sohier, chairman of the Massachusetts Highway Commission, a letter in which he called attention most emphatically to the danger that is threatening many of the highways of the country because of an embargo put upon the transportation of road oils. Understanding that embargoes had been placed which would prevent the shipment of asphaltic road oils by rail or the transportation of crude oil by boat, Col. Sohier says:

If that ruling is continued in force, we shall lose in this state and many others thousands of miles of good macadam road that can only be maintained with bituminous surface treatments and bituminous patching. Everyone knows that since motors have come in you cannot maintain macadam or gravel even for a few months without the use of some bitumen. The same is true in England and France. England is using more tar than ever since the war began. She cannot get the asphalts, but she has over 40,000 miles of road treated with tar surface applications, and several thousand miles built of bituminous concrete.

I cannot conceive today of anything more important than the main highways; and the older ones, if not built of concrete, bituminous macadam or like pavement, cannot be maintained or even properly patched without the use of some bitumen.

Think how short-sighted it is! We plan to use asphalts because it takes only 3 or 4 car-loads to the mile of road—less for surface treatments. This enables us to use poorer local materials. If we build cement concrete, we need 40 car-loads to the mile of road, or ten times as many cars. If we have to use imported stone, as we must in many places if we cannot secure bitumens, we shall need from 75 to 85 car-loads for each mile of road, or 20 times as many cars.

We are building and maintaining several hundreds of miles with sand and asphaltic residuums. All the stone would have to be imported by rail for this whole section of the state. In a number of other sections we can use gravel or local stone if we can get the bitumens; otherwise we must import stone.

If we cannot get these bitumens and get them early, it is certain, I think, that at least 600 miles of state highways, and many times as many miles of improved county and town ways on improved main routes, will be destroyed before fall. Millions of dollars will be lost in this state alone. The main roads will become impassable in many places. They will have to be entirely rebuilt, and they cannot be in these times at less than \$30,000 to \$40,000 a mile, even if you could secure the labor and materials.

In some cases, all the road requires is a few barrels of

oil or tar for slight patching. In other cases, one tank car will provide enough for two to three miles of surface treatment. Three or four tank-cars or four box-cars will provide enough bituminous material to construct or reconstruct a mile of bituminous macadam or bituminous gravel or sand road.

It will be disastrous if we cannot get bitumens. Think of the thousands of miles of road destroyed, dust everywhere ruining crops and fruits, and the millions upon millions of dollars required next year to rebuild the roads. I think some states would lose as much as or more than Massachusetts.

There was consternation last year when an embargo was put upon the hauling of stone and sand by rail, but that upon bituminous materials would appear to be even more serious. There are few sections of any state where stone or sand of at least reasonably good quality cannot be obtained within 50 to 100 miles, and for this distance the material can be hauled by truck if necessary, although the expense would generally be greater than by rail transportation. But the great majority of roads, and especially those carrying the heaviest traffic, are a thousand or more miles from the nearest source of bituminous materials, and motor transportation over such a distance is impracticable. It is rail transportation or nothing.

This being the case, there would seem to be only two alternatives—to improve and repair roads with materials not requiring bituminous binders, or to allow them to be worn out to the point where they become useless and then practically abandon them until the embargo is lifted. As Col. Sohier has shown, the former, even from the immediate viewpoint of transportation only, would be saving at the spigot to waste at the bung hole, since the construction or repair of any kind of water-bound broken stone road would require from 5 to 40 times as much freight-hauling as would be necessary where bituminous materials are used. Nor is any relief offered by the use of materials other than broken stone, except in a few sections of the country. For instance, outside of trucking distance of the region where paving brick is manufactured, the construction of a brick pavement on a concrete base would require rail hauling of more tons of material than would be required for a macadam road; and the same is true of stone block or wood block.

As to the other alternative, of allowing the roads to be worn out, this would mean the rapid elimination of practically all motor trucking, and with it such aid as this gives and is hoped to give increasingly to railroad traffic. If no bituminous material is to be available for repairing and resurfacing and if the use of the main highways is to be intensified to the extent that is now anticipated, before the end of the present season is even within sight we may expect to find many if not most of the highways full of holes and raveled areas which will not only interfere with and slow down all motor traffic, but will unquestionably result in a more or less rapid deterioration of the trucks and discouraging of their use.

Transportation is the vital problem in this country at the present time. The papers warn us that the coal transportation problem is by no means solved, although the passing of cold weather has caused it to receive less attention from the average citizen. Alarming reports are being made public concerning backwardness in the production of air-craft and other war necessities and a large part of this is attributed to deficiency in transportation facilities. It will be of little avail for the farmers to grow bumper crops, for the lumber men in the northwest to cut cedar for air-planes, for the miners to produce coal and for industries everywhere to surpass all previous records of production, if it is going to be impossible to get their products to points where they are needed.

Of importance also to highway officials, and especially

to city paving departments, is the fact that the government has requisitioned all tank steamers used for carrying oil from the asphalt fields in Mexico and other southern countries, and has requested that refining of asphalt cease for the present. It is reported that there are 400 miles of asphalt streets in Brooklyn, N. Y., for example, which need immediate repairs after a long and trying winter, but that there is a supply of asphalt on hand sufficient to keep the repair work going for only two weeks. If these repairs are not made, the condition of many of the streets will rapidly become such as to interfere seriously with the transportation of all kinds of materials, including many thousands of tons which are more or less vitally important to the war program and the feeding of the nation. There are thousands of miles of asphalt pavements in our cities that need to be repaired every year, and it is a serious question what the outcome will be if it should be impossible to obtain asphaltic materials from either the southern or western fields with which to make such repairs. It is of the greatest importance that the commissions charged with the regulation of water and rail traffic give adequate consideration to the highway traffic also and to the importance of providing means for keeping up the routes over which it must pass.

#### PRACTICAL MUNICIPAL SANITATION.

Never before this war time has the public been given so much advice as to what it is its duty to do in connection with matters which are of public concern and not to the commercial advantage of the advisor. Most of this, of course, is connected with the conservation of food, financing the government, and other features of the war program. Possibly this, like other lessons of the war (it is to be hoped), will have a permanent influence and be applied to advantage under peace conditions. One suggestion that encourages this hope comes to us from Louisiana. In a local paper we find Mayor E. M. Bodenheimer, of South Highlands, giving excellent advice in a display notice which must attract the attention of every reader of the paper. This notice begins:

##### ATTENTION! RESIDENTS OF SOUTH HIGHLANDS.

The village authorities of South Highland take this opportunity of reminding its residents that now is the time of the year to pay particular attention to the following:

See that your cisterns are well cleaned.

That your ice-boxes do not drain under the house and form pools for mosquitoes to breed in.

See that your gutters all drain well; clogged-up gutters furnish a liberal supply of mosquitoes.

That there are no pans or receptacles with standing water in them on your premises.

That your chicken yards and cow lots are thoroughly cleaned and kept clean. Don't give the fly a place in which to breed.

That your garbage cans have tight-fitting tops, thereby eliminating the chances of the fly.

That your chickens are kept up and do not spoil your neighbors' gardens.

All of the above requirements are fully covered by village ordinances.

These are most practical recommendations. If the mayor and village officials are as earnest in eliminating all mosquito-breeding places that are under their control, and in enforcing the ordinances covered by these recommendations, as the mayor is in getting these excellent suggestions before the citizens, South Highland should reap the benefits in a freedom from malaria and from mosquitoes which will give it a high standing among the municipalities of that state.



## The WEEK'S NEWS

State Highway Developments in Montana and Texas—Suppression of Venereal Diseases in Oklahoma—U. S. Public Health Service Safeguarding Milk Supplies in Areas of Federal Interest—Water Meters No Longer Compulsory in Salt Lake City—Philadelphia Water Works Strained by Demands—Boston Gets Lower Street Lighting Rates—Mobile Firemen Strike—Government Asks Philadelphia to Stop Non-Essential Improvements—Chicago's Rapid Transit Projects.

### ROADS AND PAVEMENTS

#### State Department Bridge Standardization Saves Money.

Helena, Mont.—The standardization of bridges and bridge designs, which has been undertaken by the state highway commission, has resulted already in considerable saving. A start on this was made by the former commission and the work is being carried forward by the present body. Under the old system the bridge companies prepared their own designs and the commissions had no satisfactory basis upon which to compare bids since the designs were not uniform in strength nor in cost. The bridge department was organized and technical men were employed so that county commissioners at all times could have disinterested expert advice. From the time of its organization in May until November the bridge department designed and supervised structures of an aggregate cost of \$225,000. Four bridges cost over \$25,000, two from \$10,000 to \$20,000, 15 from \$5,000 to \$10,000, and 17 \$5,000 and under. The department estimates that this standardization of bridges has saved Montana taxpayers thousands of dollars. Standardization in road work has also been a feature of the commission's activities. It held two conferences last summer with county commissioners, surveyors and road builders. These served to establish a better acquaintance among the road builders of the state, acted as a clearing house of ideas and made a start toward standardization of means and methods. It enabled the commission to get into touch with men needed for the prosecution of the work planned. From among those present a number have become directly associated with the commission. Many of these are either county commissioners or county surveyors in charge of work and not in position to give their undivided time to the work of the commission, so they have been engaged on a per diem basis to give such time as their positions permit in acting in a consulting and advisory capacity in the district where they reside.

#### Amend Motor Vehicle Tax and Highway Law.

Austin, Texas.—The House has finally passed by a vote of 108 to 7, making the emergency clause effective, the Tillotson-Blank bill defining commercial motor vehicles and fixing a scale of highway taxes upon them. The bill also empowers the state highway department to build as much as ten miles of improved roads in any county during a given year, instead of two and one-half miles as in the present law; in other words, if the county builds thirty miles, the state may put up money for an additional ten miles. Under the construction of the present law, it has been held that a commercial vehicle is one carrying either freight or passengers for hire, as the law reads, "carrying passengers or freight for hire." The new bill changes that phrase to define a commercial vehicle as one carrying "passengers for hire or freight," so all trucks will come under the terms of the statute. As finally passed the bill carries an amendment to provide that automobile taxes shall be computed upon a quarterly basis rather than semi-annually; that is, when a citizen buys a new car after October 1 he will have to pay taxes only for one-quarter of that year instead of one-half. The scale of taxes for privately owned passenger automobiles remains as at present, the House having refused amendments offered to reduce the rate from 35c. to 30c. or 25c. per horse power. If the new bill is finally enacted rent cars or service cars for carrying passengers will be taxed \$15 a

year for capacity of three passengers, \$25 a year for five passengers, and \$35 a year for seven passengers. Freight automobiles, either for private business or for rent service, will be taxed as follows, Mr. Tillotson explaining that the purpose is to levy rates according to probable damage to roadways: Up to carrying capacity of 500 pounds per wheel, or 2,000 pounds to the car, \$10; up to 750 pounds, \$15; up to 1,000 pounds, \$20; up to 2,000 pounds, \$30; up to 4,000 pounds, \$40; up to 6,000 pounds, \$60; up to 8,000 pounds, \$150; up to 10,000 pounds, \$300. For each 1,000 pounds above 10,000 pounds carrying capacity per wheel, or fraction thereof, \$50.

#### Reorganization of Paving Control.

Cleveland, O.—In direct line with the establishment by the city of a division of underground improvements, to avoid unnecessary pavement destruction, a general program of paving systematization is to be inaugurated, according to an announcement by mayor Davis. As one of the steps in this direction, direct supervision of all pavement repairs, now handled entirely by the division of streets, is to be undertaken by the city engineer, who controls the city's other paving activities. The mayor gave his approval to a plan outlined by city engineer Robert Hoffman, which provides for the systematic repaving of the city streets so as to obtain as early as possible well paved streets leading from the heart of the city out into every important section. By having the division of engineering assume supervisory control of the repair work, such conditions will be prevented as the making of extensive repairs on thoroughfares about to be repaved, or for which other improvements, such as sewers, grade crossings or other underground work are projected.

### SEWERAGE AND SANITATION

#### Typhoid Epidemic Probably Caused by Water.

Dubuque, Ia.—Dr. Hamilton, epidemiologist of the state board of health, has submitted a verbal report of the result of his investigation into the unusual number of cases of typhoid fever which have occurred here during the past several weeks. While Dr. Hamilton was not willing to say that the water was the cause, he intimated that this was his belief, declaring that many cases had developed during January, when the waterworks had been pumping river water through its mains. Dr. Hamilton praised the efforts of the local board of health in fighting the disease.

#### Oklahoma Fighting Venereal Diseases.

Oklahoma City, Okla.—For some time the state board of health under commissioner John W. Duke has been conducting a campaign on social hygiene, designed to combat venereal diseases in Oklahoma. To a large extent this campaign has been educational. The time has now come, the board feels, when more active measures must be taken without delay. The state board has far-reaching powers in this respect and will not hesitate to make use of them, following the special appeal which has been made by the United States government for action which will protect our soldiers from the danger of venereal diseases. The first work will be done with local communities, especially cities of fairly good size and situated near enough to a camp so that soldiers visit them when they have a furlough

of a day or more. The board says: "There is not the slightest excuse for the existence of a segregated district in any Oklahoma city. In addition much of the scattered vice can be put down by vigorous action on the part of the local authorities. Every community which is visited by soldiers should pass ordinances providing for the detention and treatment of every person infected with venereal disease. In addition the state board of health has passed a regulation making such diseases reportable by physicians, the same as smallpox, diphtheria and other recognized infectious diseases are. It is not necessary that sufferers from such diseases be reported by name; it can be done by initials or number. If, however, those needing treatment refuse to take it their names will be given. Detention hospitals for the treatment of infected persons will be established as needed. This already has been done with success at Lawton, where a number of women are interned for treatment. This is not done as a punishment. It is for the benefit of the person infected, as well as for the protection of the community. Dispensaries for the treatment of disease will be established. A very large number of placards calling attention to the dangers of venereal diseases have been distributed throughout the state by the board."

#### **Safeguarding Milk Supply in War Work Areas.**

Washington, D. C.—With the object of safeguarding the milk supply for workers in shipbuilding plants and other war industries and in military cantonments the U. S. public health service of the treasury department has begun consideration of the feasibility of the construction of pasteurizing plants in the vicinity of these sites. Sanitary experience, according to an official statement, is showing that the combination of a sanitary water supply and universal pasteurization of milk supplies and milk products is proportionately far more effective in preventing typhoid fever and other food and water-borne diseases than either of these measures used singly.

#### **"Treatment" of Indigent Sick.**

Toledo, O.—Joseph Kelsey, director of the division of health, in his recent annual report to the city council, says it is cheaper to pay railroad fare for sick and indigent to other cities than it is to take care of them. He says: "The matter of furnishing transportation to indigent poor when they are sick is one of the most important factors in cutting down the expense of caring for our sick. It is much cheaper to transport an injured or sick hobo to Chicago, Columbus, Cleveland, St. Louis, Pittsburgh, or intermediate points, than to keep him or her here for one, two or three months and then ask the county to bury them. I have had cases this year that I could have saved the city \$50 to \$100 on, had I had the authority to transport such patients to their destination while going was good, for if one waits until they can only be transported on a cot, it is then too late to cut down expensive hospital nursing."

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## **WATER SUPPLY**

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#### **Water Meters Not Compulsory.**

Salt Lake City, Utah.—An amendment eliminating the provision of the city water ordinance requiring compulsory metering of new premises has been passed by the city commission. This means that no longer will owners of new buildings be required to install meters. Under the new ordinance water users are given the option of paying for their water on a flat rate or on a meter rate. Before the election of C. C. Neslen as commissioner of waterworks and prior to the passage of the amendment today, erectors of new buildings were required to install meters and were not allowed the option of the flat rate. The compulsory metering provision has been the source of much protest and dissension from property owners, who preferred the flat rate system. The ordinance passed also includes a provision aimed toward the beautifying of the city. The measure provides that meter rate credit will not be allowed for parking space in front of premises

which is not properly cared for. Under the old ordinance the water used on the parking space between the sidewalk and curbing in front of meter using premises has been charged to the meter and later rebated by the city. This money will not hereafter be refunded unless the parking is maintained in proper condition. Incident to the passing of the ordinance the waterworks department announced that hereafter no installation of meters will be allowed by plumbers. The work after this must be done by plumbers employed by the waterworks department. This ruling is expected materially to decrease the cost of installation to property owners, as the department has established a fixed rate of \$2 for installation of meters in basements.

#### **Boroughs Win Long Water Rate Fight.**

Bellevue, Pa.—The supreme court decision reversing the superior court and upholding the public service commission in the Ohio valley water company case is considered a big victory for the north boroughs interested in the case, which was hard fought and of long duration. The municipalities interested in the case are Bellevue, West View, Avalon, Ben Avon, Emsworth and McKees Rocks boroughs and Neville and Stowe townships. The present charge for water is 40 cents for 1,000 gallons. The rate was set aside as excessive by the public service commission, which reduced the charge to 12 cents per 1,000 gallons, with a fixed charge to each consumer of \$6 a year. In addition, each borough was assessed a sum toward maintenance of the company's property in return for use of water for fire protection. The new rate fixed by the commission was to have become effective last year, but was suspended pending final disposition of the case. It is thought probable the water company will have to rebate consumers for the difference between the new and the old rate for the period of suspension.

#### **Demand Strains Philadelphia Water Works.**

Philadelphia, Pa.—Philadelphia's water works are being operated beyond the safety point and the pumps and other machinery are in constant danger of breaking down under the strain. The demand for water is far in excess of the capacity of the water system, and unless plans for adequate relief are begun at once a serious situation may soon confront the city. These facts are brought out in a report by Carleton E. Davis, chief of the bureau of water. Chief Davis gave figures to show that, while the city has greatly increased in population and the water requirements grown out of all proportion because of the establishment of new shipyards and munition plants and the enlargement of other industries, absolutely no provisions have been made or are under contemplation by the city for its future water needs. Chief Davis has for several years advocated the immediate construction of additional pumping stations, filter beds, reservoirs and an express service of two large mains from Torresdale to the business section of the city, but despite numerous serious breaks in the mains, due to the increased pressure needed to supply the demands, councils has never given the matter serious consideration. At least five years will be required, according to chief Davis, to bring the water system to the city's needs. Had the work been commenced when the need of the project was first felt, he said it would have been completed before the big advent of high prices for materials and labor. A statement issued by director of public works Datesman follows: "It is pointed out by chief Davis that at the present time the waterworks are being operated to a point beyond safe capacity, and he explains that the demand is greater than the supply. It is his thought that, inasmuch as the demand is so great and the operation of the works so profitable to the city, it would not only be good judgment, but good business to engage in a program of preparedness by way of improving the system and make such repairs as are necessary. He feels that money invested now for such purposes would—it is evident from the returns for 1917—be most profitable and result in bigger earnings after the improvements are made. As a simple business proposition it has been sug-



gested that the water bureau should be financed with sufficient elasticity to permit it to meet the demands of increased business as readily as any recognized public service corporation. According to the report, the waterworks earned a net profit in 1917 of \$1,500,000, equivalent to a dividend of a little more than 2 per cent on the investment. The waterworks as operated, represent an expenditure of approximately \$68,000,000. The profit as specified is the balance remaining in the city treasury from the operation of the works after all operating and maintenance expenditures are paid and after \$1,283,000 has been set aside for depreciation. The statement of the accounts of the operation of the water works includes \$67,000 for operation and maintenance of the high-pressure fire system. Chief Davis pointed out that in a strictly accounting sense this sum of \$67,000 may not be a correct charge against the waterworks proper, but is included in order that the statement may be thoroughly conservative. As a matter of fact, this is a small charge as compared with the approximately \$500,000 worth of free service which is rendered each year by the water bureau, for which no credit is given on the books of the controller or claimed in the statement of the bureau of water." The income for the year 1917 was \$5,603,928.79 and the expenses \$4,083,829.51.

#### New Rates to Meet Higher Costs.

Mansfield, O.—Water rates have been raised, according to an announcement by C. H. Stander, city service director. The new rate became effective April 1. When council last year authorized the issuance of bonds to provide meters for all water it failed to foresee that expenses would be incurred in keeping the meters in repair. At present a force of men is continually at work repairing and adjusting meters. That is an item in itself that means considerable expenditure. Last year's receipts from water rentals were \$61,000, while the estimate for running expenses this year is \$74,000. This does not include extensions which must be made to keep with constantly increased home building in new sections of the city. The scale of water rates, which became effective on the first of this month, are now: 1,500 cubic feet or less in six months, \$3; next 13,500 cubic feet in six months, 20 cents per 100 cubic feet; next 30,000 cubic feet, 15 cents per 100 cubic feet; next 60,000 cubic feet, 10 cents per 100 cubic feet; next 120,000 cubic feet, 8 cents per 100 cubic feet. In addition a change will be made in the method of payments of water bills. In the future bills in the first and second wards will be payable April 1 and October 1, while those in the third and fourth wards will be due January 1 and July 1.

## STREET LIGHTING AND POWER

#### Franchises of Merged Competing Companies.

Lockport, N. Y.—The state public service commission for the second district has handed down a decision affecting the Lockport Light, Heat & Power Company. It has decided that when a city grants franchises to two different corporations enabling them to compete for the electric light and power business in the community, and the companies are later merged, the city cannot fairly insist that the owners of the property which was installed for the benefit of the people of the city shall not be allowed to earn a fair return upon the value of all the property employed in the public service. The fact that there may be a duplication of property, the commission says, is due to the situation which was created by the city when it granted two franchises to two separate corporations, and the owners of the properties must be allowed a reasonable opportunity to work out of the difficulty. Another interesting point taken up concerns the necessity of a steam reserve station. The decision says: "It is a well-known fact that a concern like the Lockport company cannot always be assured that it will have a never-failing supply of hydroelectric power, even though it does come from the mighty falls of Niagara. Delays and interruptions are a necessary incident to the business of transmitting electric

energy from the source of supply to the point of distribution over long transmission lines; they are in most instances inevitable. When this happens, all the industries dependent upon this power are subject to serious loss and inconvenience, even if the interruption in the service is only of brief duration. There is hardly an electric light and power company of any consequence in the state purchasing hydroelectric energy for distribution which has not some sort of steam reserve to back it up for the purpose of taking care of interruptions as well as to cut down the peak, inasmuch as hydroelectric power is usually sold on the basis of the peak-load demand. It may be that the steam plant will not be called on for weeks at a time to supply electricity because of the failure of the hydroelectric energy, but when it is needed it is there ready for use, and it enables the company to continue to supply its customers and reduce losses which might otherwise result."

#### Municipal Plant Raises Rates.

Green River, Utah.—Permission to increase its rates from 10 cents to 12½ cents a kilowatt hour has been granted by the public utilities commission to the municipal light plant of Green River. The increase is estimated to add about \$1,000 a year to the revenues from the plant. The plant develops about six times as much power as it sells, and H. H. Blood, member of the commission who presided at the recent hearings on the increase question, urged on the city of Green River adopting a policy under which the surplus power may be used for irrigation of territory near the town which is said to have suffered from lack of water for crops. Mr. Blood said he believed some such action would be taken and that with the increased rate the plant would pay for its own operation and maintenance and leave a surplus for depreciation.

#### Big Street-Lighting Rate Reduction for Boston.

Boston, Mass.—The Massachusetts Gas and Electric Light Commission has ordered important and substantial reductions in the rates for lighting the streets charged the city by the Edison Electric Company. This well-known arbitration case has lasted more than three years, producing over 10,000 pages of testimony and more than 360 tables and exhibits. It is calculated that the reductions established will save the city about \$600,000 during the life of the contract arbitrated from November 6, 1914, to November 6, 1924. The case was brought about as a result of the agreement between the city and the company, which requested the board to investigate and decide whether the street-lighting rates are as a whole fair, taking into account length of time, discount and other considerations. Under the agreement the commission had no authority to interfere with the contract rates unless it determined that a fair price for the entire service supplied to the city is less than the total amounts to be paid according to the schedule. Therefore the question was whether a fair price for the entire service was less than these amounts. The agreement authorized the board in that event to reduce one or more of the rates charged, substituting such rates from the beginning of the agreement for the corresponding rates in Schedule E. The schedule prices per lamp per year and the amounts awarded are as follows:

	Schedule	Board Price
Magnetite arc, 800-cp.....	\$87.530	\$79.60
40-cp. incandescent .....	18.333	15.92
60-cp. incandescent .....	21.136	17.69
80-cp. incandescent .....	29.310	22.94
100-cp. incandescent .....	33.426	29.98

On the agreement date there were 4,543 magnetic arcs, twenty-four flaming arcs and 4,083 incandescent lamps of 40-cp. to 400-cp. rating, 2,910 being of 40-cp. size. Lamps and equipment were supplied by the company at its expense, save certain former gas-lamp posts owned by the city and later used for electric lighting. The agreement provides for extensions of service, relocations of lamps and substitutions of other type lamps, but upon terms designed not to increase thereby the relative cost to the company of supplying service and to compensate the city for any reduction in such cost. Also, the number of lamps of any type required by the city shall not at any time during the agreement, save as streets may be discontinued, be less than 95 per cent of the maximum number of such lamps in service at any time prior to the agreement.

The company computed a cost greatly in excess of the aggregate price for the service expressed in the contract, but the figures were made before close analysis of costs was undertaken in its behalf. The greatest differences in estimated costs of the property involved arose with respect to the

distributing system and especially the underground installation.

The aggregate cost to the city of the lamps in service on the date of the agreement was \$479,718.70 per year. The concrete question was whether or not this is a fair price for the entire service. The city conceded the soundness of basing the price upon cost, but re-examined all expense and property items exhibited by the company and challenged many. Comparative summaries follow:

	Company	City
Operating expenses .....	\$314,013	\$235,986
Taxes .....	60,503	42,096
Depreciation .....	42,000	34,622
Return .....	197,994	96,571
Total .....	\$614,510	\$409,275

The commission says: "A fair price for the entire service supplied the municipality must in any event take into account such exclusive costs both of investment and operation. But, when it comes to the investment and expenses common to the company's entire system and business, any assignment to the city of a definite share in each item depends primarily on the assumed necessity of making such assignment. . . . Had the company never lighted the streets of Boston there is little, if any, of its plant other than that devoted exclusively to the service with which it could or would have dispensed. Even while the case was pending the growth of the commercial business changed substantially the ratio of the city's demand to the company's peak—a ratio used repeatedly in determining and stating with 'illusive inexactness' items of investment and expense attributable to the city. Neither party sought to measure the fair price of the entire service by its cost if independently performed, and both parties recognized the community of interest alluded to in dealing with the generating and transmission expenses. The evidence disclosed hidden among the legal expenses of the company large payments made for the maintenance of lobbies at the state house and city hall. Aside from the exclusion of such items, in finding a fair and reasonable cost of the service, the board, in view of its public character and of the paramount duty of seeing that the companies under its supervision in the conduct of their business and the uses and devotion of their resources practice and maintain high civic standards, feels bound to condemn such expenditures as wholly unwarranted and inconsistent with such standards." Upon the whole, the commission finds that a fair price for the entire service supplied to the city is less than the total amounts to be paid according to Schedule E of the contract and is the sum of \$437,000, and it therefore reduces the so-called running costs per lamp-hour in the following rates charged according to Schedule E, with respect to the following described lamps and with the resulting prices for 3,828 hours a year after deducting a discount of 10 per cent:

40-cp. series incandescent lamp from 0.25 to 0.18 cent.	\$15.92
60-cp. series incandescent lamp from 0.30 to 0.20 cent.	17.69
80-cp. series incandescent lamp from 0.40 to 0.30 cent.	22.94
100-cp. series incandescent lamp from 0.50 to 0.40 cent.	29.98
800-cp. series magnetite 500-watt d.c. arc lamp 1.60 to 1.37 cent.	79.60

## FIRE AND POLICE

### Leather Factory Blaze Makes Quick Headway.

Detroit, Mich.—Bursting into full force within a few moments, fire in a brief but spectacular blaze destroyed the stock of leather goods and equipment of a harness and leather goods manufacturer and wrecked the four-story building occupied by the concern. The stock included, it is said, 24,000 sets of finished harness and saddlery for the United States army, and one feature of the blaze has given the police some basis for considering a theory of incendiarism. This feature was the big headway gained by the fire. All four floors were in full blaze when members of the Michigan state constabulary, on guard on the water front, ran to the scene. They found one end of the building a mass of flames. Timothy E. Callahan, assistant fire chief, said the blaze had gained such headway when the first apparatus arrived that awnings on buildings across the street had taken fire. Incidental to the unusual circumstances were alarms of fire, one from the west side and one from the east side. The explosion is believed to have been due to the blowing out of windows on one side, under pressure of smoke, heat and gasses. The total loss by fire,

water and smoke will approach \$500,000, it is believed. The rapidity with which the fire attained its great spread before being discovered may have been due in part to the fact that the floors of the building were more or less saturated with harness oils and oil in some quantities was kept in the building.

### Police Pension Law Held Not Retroactive.

Trenton, N. J.—That the act of 1915, creating a policemen's and firemen's pension fund, has a prospective rather than a retroactive effect was the conclusion reached in an opinion filed in the supreme court upholding the commissioners of Trenton in dismissing a petition filed by Mrs. Kate V. Irving, who sought a pension because of the death of her husband, Charles, a patrolman for nine years. Irving died March 20, 1914, and the act was not approved until April 8, 1915. In deciding the case the supreme court said the only point involved was whether the act in question was to be given a prospective or retroactive effect. "There is nothing on its face to indicate," said the court, "that the legislature intended that it should be retroactive. It is the accepted law in this state that statutes are to be given prospective and not retroactive effect unless their language makes them retroactive and admits of no other construction."

### Firemen Strike for Higher Pay.

Mobile, Ala.—With twenty members of the fire department on a strike demanding an increase in wages, Mobile was left without sufficient fire fighting forces to man its fire houses. One fire station was left entirely unmanned. City commissioner Crawford called for the soldiers doing duty on the water front to aid in the protection of property. Members of the police and street departments were asked to take the places of the striking firemen. The strike followed the refusal of the city to grant the firemen an increase of wages and the discharge by commissioner Crawford of Felix Wainwright, president of the firemen's union. The commissioner stated that the city was unable to meet the firemen's demands, asking for a salary increase from \$65 to \$90 per month. President Wainwright said that the union firemen would respond to calls only from government plants. The firemen's union was organized here about six months ago.

## GOVERNMENT AND FINANCE

### Government to Halt Unnecessary Improvements.

Philadelphia, Pa.—All work on municipal improvements in Philadelphia that are not necessary to the safety and health of the public will probably soon be stopped by the government for the duration of the war in order that labor, materials and credit so used may be diverted to the needs of the government. Contracts aggregating \$92,000,000 will be involved in the order. Announcement to this effect was made following a conference attended by Richard L. Austin, of the federal reserve bank and chairman of a subcommittee of the capital issues committee of the treasury department; John M. Walton, city controller; John M. Connelly, city solicitor; director Twining, and Joseph Smith, secretary to the mayor. Mr. Austin was asked by secretary McAdoo to investigate every department of the city government to ascertain what public works can be held up until after the war, in accordance with an appeal made about a month ago that all non-essential public work be stopped for the duration of the war so that the government may have a wider field for obtaining labor, materials and credit. The principal work that is affected is the building of the subway loop and sections under the city hall, the Frankford elevated line and the Parkway. Director Twining was requested to prepare a report on the condition of the work of the transit lines, which will be submitted to Washington. No direct order or request for the stopping of the work was issued, only the intimation being made that such a request may soon be forthcoming from Washington and that the city officials prepare themselves accordingly. Mr. Austin visited every department in the city hall. He expressed much surprise at the number of men



at work about the building. "What do all these men do?" he asked. "Here are a lot of men painting, repairing and making improvements to the building that could be used in war work. All this work here could be postponed for years. There is lots of work that cannot be abandoned, such as the laying of sewers, improvement of the water system and fire department and health measures. If, however, the city purposes to keep on with the subway under city hall, the Frankford elevated, the Parkway and other similar work borrowings of more than \$15,000,000 will be necessary which otherwise might be invested in Liberty bonds. While no steel is used in the construction of the Parkway, yet sand, gravel and stone are required, which are needed by the government."

#### City Treasurer Becomes City Manager.

Sandusky, O.—The city commission has elected city treasurer George M. Zimmerman city manager to succeed George T. Lehrer, who resigned. Lehrer got \$3,000 a year. Zimmerman will get \$3,600 a year, the salary Kenneth B. Ward, Lehrer's predecessor received. Leroy Hobert, Zimmerman's deputy, was elected treasurer, succeeding Zimmerman, at a salary of \$1,500 a year, \$900 less than Zimmerman received. No deputy treasurer will be appointed. Both appointments became effective April 1.

#### State Auditor Finds Discrepancies in City Accounts.

Albany, N. Y.—Discrepancies in the financial accounts of 24 of the 52 municipalities examined last year, varying in amounts from \$100 to \$3,800 and averaging \$976.16, are disclosed in the special report on municipal accounts, submitted to the legislature by state comptroller Travis. In all these examinations, the comptroller's report shows, there was discovered \$79,436.39 expended for purposes not legally chargeable, making an average shortage of \$100 or more in the accounts of one out of every three municipalities examined. Some of the discrepancies, the comptroller points out, were occasioned by the stealing or peculations of officials, and involved moral turpitude. In several instances, he shows, criminal proceedings have been instituted and the offenders tried and imprisoned. In other cases these deficiencies were attributed to the failure to keep accurate accounts and the neglect of officials to correct errors in their favor. With no disposition to reflect unduly, the comptroller calls attention to the number of errors made against municipalities as greatly outnumbering those against the interest of officials.

## TRAFFIC AND TRANSPORTATION

#### Six-Cent Fare Granted to Interurban.

Phillipsburg, N. J.—The Northampton, Easton & Washington Traction Company of Easton, Pa., has been permitted by the state board of public utility commissioners of New Jersey to increase the rate of fare from five cents to six cents in each of the seven fare zones from Phillipsburg to Port Murray, N. J., a distance of seventeen miles. This follows the application made previously to the commission, but denied by it in July, 1917, because of court rulings, which have since been more liberally construed. At the previous hearing it had been shown that there was a deficit of \$7,150 for the year 1915, and a deficit of \$5,311 for the year 1916. The additional proofs offered when the appeal to the commission was renewed showed a deficit of \$7,131 for 1917, and a comparative deficit for January and February, 1918, of an increased amount. No money had been set aside for depreciation in any of the years mentioned. The net operating return had been and continued to be insufficient to meet interest on the bonded debt, but the interest on the bonded debt of the company had been paid, any deficit in the sum of money required for the payment of interest having been loaned by the Northampton, Easton & Washington Traction Company of Pennsylvania to the New Jersey company. The New Jersey board last July recognized the serious financial condition of the company, but felt that it could not grant it relief because of its interpretation of the decision of the New Jersey supreme court in the case of the Atlantic Coast Electric

Railroad vs. the Public Service Commissioners. The company caused the findings of the board in its proceedings to be reviewed by the supreme court, and the decision filed holds that it is the duty of the board to approve the establishment of a just and reasonable rate, when it appears that the existing rate is insufficient regardless of limitations contained in municipal ordinances respecting rates of fare. The July order was therefore set aside and the company renewed its application for the increased fares.

#### Progress on Chicago's Transportation Projects.

Chicago, Ill.—The local transportation committee of the city council has agreed with the recommendation of the traction and subway commission's physical plan for the immediate construction of three subways and four elevated line extensions. This would provide a complete reorganization of transportation in the city, increasing the rapid transit facilities 150 per cent in the first six-year period. The new plan would serve 60 to 70 per cent of the population with rapid transit where now 20 per cent is served. The program involves the expenditure of more than \$100,000,000. The money is at hand. A sub-committee has been appointed to draft an ordinance and submit it to the local committee at an early date. This sub-committee will designate the length of the franchise.

#### Court Overrules Commission on Diversion of Cars.

Seattle, Wash.—The state supreme court has dismissed the order of the public service commission which required the Puget Sound Traction, Light & Power Company to divert a certain car line through the downtown section of Seattle during the heavy traffic hours of morning and evening. The case has been in the courts for two years. The supreme court held that the through service order granted by the commission in 1915 and later upheld by the superior court of Thurston county was unreasonable and that some inconvenience must be expected in reaching the city by residents of the outlying district. The company contended that its yearly operating expenses would be increased \$19,000 by routing its cars through the city. The decision states that in satisfying the public need a carrier is not also bound to satisfy a public convenience at any considerable loss to itself, when the service is already adequate.

#### Commission Says Cities Should Not Enforce Franchises.

Sacramento, Cal.—The state railroad commission has been making an investigation of the transportation system of the state during the emergency period created by war. It has announced several recommendations. Most of the suggestions are concerned with the problems of steam operation, but one directly affects electric railways and other utilities in California and the attitude of cities towards them in the matter of enforcing franchise requirements. The commission says: "State, county and city governmental authorities should not require utilities, during the present emergency, to live up to franchise requirements which call for improvements, street work, etc., that is not absolutely necessary for operation. Moreover, all public improvements not necessary in the prosecution of the war should be deferred so that the labor and materials may be available for railroads or other necessary war work." On this subject the commission said: "Steam, electric interurban, and street railways, as well as other public utilities, should not be required at this time to live up to such of their franchise stipulations as necessitate otherwise uncalled for new construction, such as street paving in cities, replacement of existing T-rail with more expensive girder rail, and similar items. The latter suggestion will, of course, have its effect also on maintenance and capital expenditures and consequently on the net earnings of the carriers. We recommend that the commission address the appropriate state, county and city governmental authorities, inviting their cooperation with the program. We also suggest that the commission offer its informal assistance in cases where, by reason of franchise requirements, a city insists upon construction work which is not essential and which would appear to interfere with the more important railroad work."

## NEWS OF THE SOCIETIES

### CALENDAR OF MEETINGS.

**April 15, 16.**—SOUTHWESTERN ELECTRICAL AND GAS ASSOCIATION. Annual convention, Galveston, Tex. Secretary, H. S. Cooper, Dallas, Tex.

**April 15-17.**—UNITED STATES GOOD ROADS ASSOCIATION. Annual convention, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

**April 18-19.**—BANKHEAD NATIONAL HIGHWAY ASSOCIATION. Annual meeting, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

**April 18-20.**—SOUTHWESTERN SOCIETY OF ENGINEERS. Annual convention, Douglas, Bisbee and Tucson, Ariz. Secretary, C. E. Barglebaugh, El Paso, Tex.

**April 23-24.**—LEVEE AND DRAINAGE CONTRACTORS' ASSOCIATION OF THE UNITED STATES. Conference, St. Louis, Mo. Secretary-treasurer, C. S. Gannon, 421 National Bank of Commerce Bldg., St. Louis, Mo.

**April 23-26.**—SOUTHWESTERN WATER WORKS ASSOCIATION. Seventh annual convention, Tulsa, Okla. Secretary-treasurer, E. L. Fulkerson, Waco, Tex.

**May 13-17.**—AMERICAN WATER WORKS ASSOCIATION. Annual convention, St. Louis, Mo. Secretary, J. M. Diven, 47 State street, Troy, N. Y.

**May 21-23.**—ARKANSAS ASSOCIATION OF PUBLIC UTILITY OPERATORS. Annual convention, Hot Springs, Ark.

**June 4-7.**—AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Spring meeting, Worcester, Mass.

**June 24-26.**—AMERICAN CONCRETE INSTITUTE. Annual meeting, Atlantic City, N. J.

**June 25-28.**—AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting, Atlantic City, N. J. Secretary-treasurer, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

**June 26-28.**—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Annual convention, Atlantic City, N. J. Secretary, F. L. Hutchinson, 33 West 39th St., New York City.

### Engineering Foundation.

At the recent annual meeting of the Engineering Foundation, held in New York, the following officers were elected for 1918: Chairman, Michael I. Pupin (re-elected); vice-chairmen (two), Edward Dean Adams and (new) W. F. M. Goss; secretary (re-elected), Alfred D. Flinn; treasurer (re-elected), Joseph Struthers.

### American Association of Engineers.

A ballot has been sent out to about 250 engineering societies by the American Association of Engineers for the purpose of securing an opinion on public questions to be taken up at the fourth annual convention of this association, May 14 next, in Chicago.

The letter transmitting the ballot characterizes the first proposition to be voted on, the desirability of passing the bill incorporating the American Academy of Engineers, as undemocratic and un-American. According to the letter, this bill seeks to establish an aristocracy of engineers.

The second question, regarding the granting of A-1 priority for equipment needed for drainage work, is commented on in the letter of transmittal as involving the serious question of

producing sufficient foodstuffs during the next year.

The third question is that of universal military training. It is proposed later to submit referenda on the licensing of engineers, railway ownership and similar subjects.

This, according to A. H. Krom, general secretary of the association, is the first effort to obtain the opinion of the engineering profession on national questions by referendum.

The committee on engineering cooperation unites in extending an invitation from the American Association of Engineers to other organizations, asking them to send delegates to the annual meeting of the association in Chicago May 14 to consider co-operative plans.

### Western Society of Engineers.

The Western Society of Engineers recently held a meeting at which the subject of discussion was "Meeting the Material Situation." The work and purpose of the Priority Division of the Council of National Defense and the administration of priority regulations governing the distribution of construction materials were explained. Three papers were read on the question, "What the Engineer Can Expect from Industries Supplying the Basic Engineering Materials." "Structural Steel Plants" were discussed by F. J. Llewellyn, division contracting man-

ager, American Bridge Co.; "Lumber Industry" was taken up by Herman von Schrenk, consulting timber engineer, and "Concrete" was the topic of B. F. Affleck, president Portland Cement Association.

### Levee and Drainage Contractors' Association of the United States.

A conference is to be held at St. Louis, April 23-24, by the Levee and Drainage Contractors' Association of the United States. The purpose of the meeting will be to demonstrate how the food production of the nation may be increased by bringing under cultivation millions of acres of arable land now uncultivated because of overflow or too much water. All who are interested in this purpose are invited to participate in the conference.

The president of the association is Otto Kochtitzky, Cape Girardeau, Mo.; C. S. Gannon, 421 National Bank of Commerce Building, St. Louis, Mo., is secretary and treasurer.

### Wyoming Engineering Society.

Engineers from almost all parts of Wyoming were recently in Cheyenne for the purpose of forming an engineering association. The organization was formally launched at the closing session of the meeting under the name of the Wyoming Engineering Society.

F. C. Emerson, of Worland, was elected president; Professor J. C. Fitterer, of the University of Wyoming, was chosen vice-president, and H. C. Watson, of Cheyenne, treasurer.

A banquet in the Plains Hotel  
(Continued on page 292.)

## PROBLEMS CITIES ARE STUDYING WITH EXPERTS

**STREET IMPROVEMENTS** are to be made by Lake Alfred, Fla. The engineer retained for the improvement is J. W. Turner.

Trenton, N. J., is to construct a steel and concrete **BRIDGE**. J. W. Thompson has been retained as consulting engineer for the structure.

In making **SEWER** extensions Sleepy Eye, Minn., has the consulting engineering services of the firm of Burns & McDonnell.

Victor, Ia., is to improve its **SEWER SYSTEM**. Plans and specifications for the work have been completed by the engineering firm of M. Tschirgi & Sons.

Holyoke, Colo., is to make improvements to its **WATER WORKS SYSTEM** and to construct a **SEWERAGE SYSTEM**. Royal D. Salisbury is consulting engineer, and has prepared plans and specifications for the work.

The town board of Manville, Wyo., is contemplating the installation of a **LIGHTING SYSTEM** and the construction of a **SEWERAGE SYSTEM**. C. C. Carlisle has been retained to advise the officials.

The village of Lovington, Ill., is to make **STREET IMPROVEMENTS**. The engineer for the work is L. W. Lemon.

Carthage, S. D., is to build a large steel tank for its **WATER SUPPLY**. The engineer for the structure is J. F. Druar.

New machinery is to be installed in the **WATERWORKS** of North Canton, O. The engineering firm of Cuiler & Rice is in charge of the work.

Marshall County, Holly Spring, Miss., is to make **HIGHWAY IMPROVEMENTS**. The engineer for the work is Joseph P. Carey.

St. Francis County, Little Rock, Ark., is to make extensive **HIGHWAY IMPROVEMENTS**. Plans for the work were prepared by the consulting engineering firm of Herring & Schellhons.

Summit County, Akron, O., is to install **WATER** and **SEWAGE DISPOSAL PLANTS** at the county infirmary. M. P. Lauer has been retained to prepare plans and specifications for the improvements.



# NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

## HIGHWAY CULVERT PIPE.

### Short Lengths of Cast Iron Pipe for Saving Labor.

With the ever-increasing scarcity of man-power for building our roads many manufacturers have come forward with helpful suggestions, with machinery with which one or two men can do the work of many, and with methods of making materials easier to handle.

Realizing that short lengths of cast iron culvert pipe can be installed with fewer men, the U. S. Cast Iron Pipe and Foundry Company, of Burlington, N. J., is now offering its cast iron culvert pipe in 4 ft., 6 ft., 8 ft., 12 ft. and 5 meter (16 ft., 5 inches) lengths. In many cases the last two lengths mentioned can be used to good advantage, but in inaccessible places the shorter lengths are much cheaper to handle. This is the first time bell and spigot cast iron pipe has been available in lengths under 12 ft., and those interested in highway construction will appreciate the advantage of the lighter units.

Where head-walls are used it is often desirable to have a bell at either end of the culvert. This helps to maintain true alignment and at the same time gives a finish to the job. To produce this it is possible to secure what is known as the "crown length" of cast iron culvert pipe. This is a 12-ft. length of pipe with a bell on either end, as shown in the illustrations.

The cross-section shown here indicates the advantage of this "crown length." It is placed under the crown of the road, doing away with center joints and the possibility of undermining at that point. By the use of the "crown length" the engineer secures a more even distribution of strength in the part of the road where it is most needed, and at the same

time may finish the culvert with shorter lengths if desired.

Beside the labor economy of the shorter lengths the economy due to the long life of this pipe should be an important factor to those who are building for permanence.

## INDUSTRIAL NEWS

**Cast Iron Pipe.**—Government prices remain constant, but there is still a tendency to cut where business is competitive. Quotations: Chicago, 4-inch, Class B and heavier, \$57.30; 6-inch, \$54.30. New York, 4-inch, Class B and heavier, \$58.35; 6-inch, \$55.35; 3-inch, \$65.35. Birmingham, 4-inch, Class B and heavier, \$52; 6-inch, \$49; Class A \$1 extra.

### Federal Price-Fixing Board.

The Council of National Defense recently gave out the following statement:

Under the authority of the War Industries Board there has been created a body to be known as the price-fixing committee, with its personnel composed of Robert S. Brookings, of the War Industries Board, chairman; Brigadier-General Palmer E. Pierce, Surveyor-General of Supplies for the War Department; Paymaster John Hancock, of the Bureau of Supplies and Accounts of the Navy; Dr. H. A. Garfield, Fuel Administrator; F. W. Taussig, chairman of the United States Tariff Commission; W. J. Harris, chairman of the Federal Trade Commission; Hugh Frayne, of the War Industries Board, and Bernard M. Baruch, ex-officio. Another civilian member of the committee will later be appointed.

The duties of the price-fixing committee will be to pass upon prices for all basic raw materials and to estab-

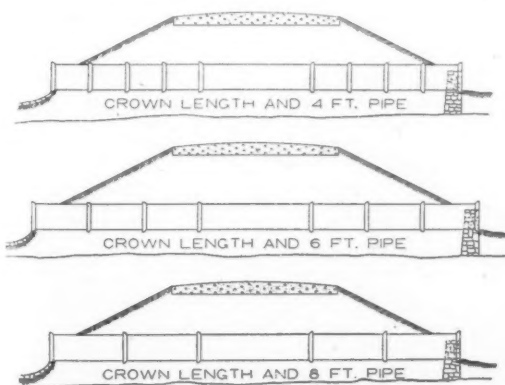
lish from time to time a price-fixing policy, to be submitted to the President for approval. Any of the executive departments having difficulty in the handling of price-fixing matters will have the advice and assistance of the price-fixing committee when desired.

The object of the price-fixing committee is twofold: First, it will be a separate body, quasi judicial in nature, for the purpose implied in its name, and it will serve this purpose through being made up of men separated so completely from industrial interests that their motives and actions in the determination of prices can be subject to its suspicion of mercenary interest. Prices will not be made until after costs have been passed upon by the Federal Trade Commission. With costs as a basis the price-fixing committee will then consider problems of production and distribution before arriving at its decisions.

The second object to be achieved by the price-fixing committee is speed. The committee will sit all the time, and will thus eliminate unnecessary delay caused by the consideration of price-fixing problems in several different quarters.

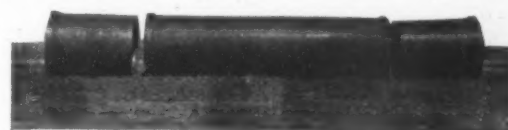
### Associated Manufacturers of Electrical Supplies.

The Associated Manufacturers of Electrical Supplies met in third annual convention at Delmonico's, New York City, on March 21, the meeting being the most largely attended of any since the association was formed. An interesting and valuable program of discussion was carried through. General secretary Charles E. Dustin reported that 102 meetings of sections had been held during the year, and that all of these were well attended. Charles L. Eidlitz reported in favor of trade

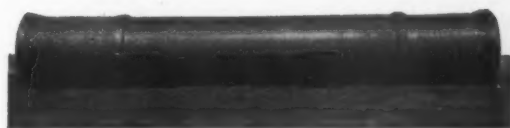


The installation of Crown Lengths in conjunction with the various other Lengths available.

USE OF  
"CROWN LENGTHS"  
OF  
CAST IRON  
CULVERT  
PIPE.



Crown Length and 4-foot Lengths before assembling.



Crown Length and 4-foot Lengths as they will appear in the trench.

acceptances, and after an interesting discussion the matter was referred to the board of governors for further consideration.

The following officers were elected for the ensuing year: President, A. W. Berresford, Cutler-Hammer Manufacturing Company, Milwaukee, Wis.; vice-president, B. E. Salisbury, Pass & Seymour, Inc., Solvay, N. Y.; treasurer, J. W. Perry, H. W. Johns-Manville Company, New York (re-elected); general secretary, Charles E. Dustin, New York.

The annual banquet, held on Thursday evening, was well attended. The retiring president, H. B. Crouse, presided.

#### Mack Trucks in Road Work in France.

Motor trucks by the thousands will help effectively the U. S. Road Engineers engaged in new construction back of our lines. It is estimated that one thousand two hundred miles of highways will be built in 1918 by American road engineers in the rear of the firing line in France. To the special road building battalions is delegated the important task of keeping lines of communication constantly open. Among the trucks engaged many Mack trucks, made by the International Motor Co., New York, N. Y., are working in conjunction with modern American road machinery helping to build new strategic lines and keep communicating roads in constant repair. The Mack fleet will be composed of several thousand dump trucks, hot road oilers, pressure sprinklers for making water-bound macadam, gasoline tank trucks, printing press trucks for printing blue prints, instructions, plans, reports, etc., machine shop trucks, blacksmith and tool repairing trucks.

## NEWS OF THE SOCIETIES

(Continued from page 290.)

brought to a close the first gathering of the engineers.

Cheyenne was again selected as the city for the next meeting of the society, which will take place some time in January, 1919.

The engineers visited the city filtration works at Round Top. The rest of the day was spent in devising and adopting a constitution.

It was decided that the membership of the society should be divided into three classes: Regular members, associate members and junior members. Qualifications for regular membership will consist of having had at least three years' experience in a responsible engineering position and one year's residence in the state. A degree from a recognized engineering college will be accepted in lieu of one year's working experience. The requirements for an associate member are two years of experience in charge of engineering works and one year's residence in the state. Any one having reached the junior year at an engineering college

will be accepted as a junior member.

The object of the society is to bring the engineers of the state into closer relationship with one another; discussion of problems pertaining to the engineering profession, and the coordination of efforts in bringing about any necessary legislation relative to engineering in the state.

Recommendations for amendments to the existing laws in the state regarding the licensing of engineers will be submitted at the next session of the state legislature.

#### Highway Traffic Association of New York.

A public meeting of the Highway Traffic Association of the State of New York will be held in the grill room of the Automobile Club of America, 247 West 54th street, New York City, at 8:30 p. m. on Tuesday, April 16, 1918. Mr. S. M. Williams, president, Highway Industries Association, will speak on the topic "Highway Transportation Jeopardized." The address will be followed by a general discussion.

#### Oregon Society of Engineers.

Under the auspices of the Oregon Society of Engineers E. B. Thompson recently gave an illustrated lecture before the members of the American Society of Civil Engineers, American Institute of Electrical Engineers, National Electric Light Association, Northwestern Association of Highway Engineers, Oregon Society of Engineers and others on "The Oregon City Locks."

#### North Dakota Society of Engineers.

An unusually large number of members attended the recent tenth annual convention of the North Dakota Society of Engineers held at Fargo. The sessions were especially concerned with land drainage and highway construction as well as to the distribution and consumption of fuel. Officers for 1918 were elected as follows: President, E. J. Thomas, city engineer of Minot; vice-presidents, G. W. Heinmiller and W. R. Veigel, city engineer of Carrington and Dickinson. Prof. E. F. Chandler, University, N. D., is secretary. Next year's convention will be held in Valley City.

## PERSONALS

Chiple, Dudley, has been appointed engineer for Muscogee County, Ga., to succeed the late J. R. Lane and the late L. A. Scarbrough.

Hanson, Ole., was recently elected mayor of Seattle, Wash.

Conway, John F., who was chief of the Jersey City, N. J., fire department for twenty-three years, died recently at his home, aged sixty-three years.

Amiss, Thomas, L., has been appointed superintendent of the Shreveport, La., water department to succeed W. R. Goss. Mr. Amiss, who has been assistant superintendent, has been with the department over seventeen years.

Leo, John P., an architect, has been appointed chairman of the Board of Standards and Appeals of New York City at a salary of \$7,500 a year.

Strauss, Charles, has resigned his position of Commissioner of the Board of Water Supply, New York City, on the ground that with the practical completion of the Catskill Aqueduct system the present commission of three members was not justified. Each receives \$12,000 a year.

Greenleaf, W. A., has been appointed city engineer of Independence, Kan., succeeding George E. Weaver, who served in that capacity for six years. Mr. Greenleaf was formerly construction engineer with E. T. Archer & Co., Kansas City, and before that engineer of the Omaha (Neb.) Water Company.

City manager H. G. Otis, of Auburn, Me., has appointed G. H. Stevens city engineer and reappointed street commissioner Rowe.

Whitney, Harrie L., has resigned his position as city engineer of Beverly, Mass., which he has held for eleven years.

Sanborn, Osmund P., is now chief engineer of the Biddeford, Me., fire department.

The following were recently elected in Cumberland, Md.: Mayor, Dr. Thomas W. Koon (re-elected); commissioners, Charles C. Deetz, Harry L. Smith and Dr. Theodore A. K. Hummelshime.

TYPE OF  
MACK TRUCK  
AT WORK ON  
ROAD-BUILDING  
"OVER THERE."

